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PRACTICAL

HYDROTHERAPY

A MANUAL

For Students and Practitioners

BY

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THIS BOOK IS DEDICATED

TO THE MEMORY OF

MY FATHER AND MOTHER

AS A SLIGHT TOKEN OF THE

DEEP LOVE AND RESPECT OF THEIR SON

THE AUTHOR

PREFACE.

THE author offers no apology for another work upon hydrotherapy, as there are at present very few works in the English language.

It cannot be denied that much prejudice has heretofore existed against "baths" owing to their purely empirical application, but with the advent of instruments of precision and the establishment of their physiological action, *scientific* hydrotherapy has taken its place among the accepted therapeutic methods of medicine.

It has seemed strange at times why the brilliant *clinicians* of this country have failed to use hydrotherapy as a curative agent, but of late years this cannot be said save in certain quarters, for the profession is rapidly awakening to the broad field of usefulness possessed by this agent.

The plan adopted has been to ascertain all the facts possible, no matter from what source, the writer's experience then added, and from the data thus obtained, the different chapters have been written. The aim has been to simplify hydrotherapy and to so plainly and clearly lay before the reader the essential facts as to render them easy of mastery, accessible and useful.

The hydriatist's art has not been magnified nor has the author indulged in a minute and endless subdivision of baths, both general and local, each with their physiological and therapeutic action separate, but has as far as is possible *grouped* together those procedures whose technique, physiological action and therapy closely resemble one another, thus enabling the student to master the action of "groups" rather than each separate form.

To the student or practitioner who may desire to systematically acquire a knowledge of hydrotherapy, due warning is given that there is no royal road to knowledge, and that this is true of hydrotherapy as well as of all the other departments of science. However, a certain line of procedure may aid in more easily mastering the art. It would not be amiss to cursorily refresh his general knowledge of the anatomy of the nervous system, of the blood and lymph circulations. He should then carefully ground himself in the physiological action of water and its associated applications, such as hot air, electric light baths, etc. A mastery of the general principles of hydrotherapy, its rules and regulations, will make the technique more easy of comprehension and its rationale apparent.

Much information and a clearer insight than mere description can give, is to note the physiological action of hydrotherapy by "putting yourself in his place." One application of a cold jet douche to the

spine gives more realistic information than pages of description. I therefore make the suggestion to "practice on yourself" first. Many experiments herein mentioned have had the author as principal party in interest.

It should never be forgotten that physiological forces so powerful for good may equally work havoc if carelessly and improperly applied. Therefore utility and exactitude of method have been the constant aim.

In the therapeutic section rare diseases have not been considered unless water possesses some curative value in that particular disease. Theories have been avoided as they generally prove a burden and interfere with a clear comprehension of the agent. Physicians nor remedies possess healing powers, but the curative process, as is well known, resides within the body, and it is the body that heals itself. I believe that water is an agent more capable of developing natural healing powers in the system and in resisting the onset, development and extension of disease, than any other known *single* measure.

Some will doubtless think that the chapters dealing with nervous and mental diseases, drug habits and alcoholism have been needlessly enlarged. The nihilism of therapeutics that pervades these branches, the neglect of a remedial measure so powerful for betterment and "cure," has led to a broad and full consideration of these subjects, with the hope that specialists in these various fields of the therapeutic art may be induced to use this remedy more extensively than is the case at present.

A careful perusal will show that hydrotherapy offers an extensive and useful field to the practitioner in acute and subacute conditions, for there are many cases, especially of acute diseases, that could be treated at home by the family physician with success, and it is believed that a careful study of the possibilities of hydrotherapy will convince many medical men who do not now use hydriatics, that it is a valuable addition and supplement to their other efforts. Chronic cases are best treated in sanatoria because of the facilities, the experience, skill and knowledge required by the physician in charge, assisted by a well-trained staff.

Twenty years as teacher of students and nurses, twenty years at the head of a sanatorium, in active hospital and private practice, has constituted an experience upon which the author has freely drawn.

Thanks are due to the publishers for their uniform courtesy, kind consideration and willingness to make this book represent the author's views.

THE AUTHOR.

LOUISVILLE, KY., SEPTEMBER, 1909.

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PRACTICAL HYDROTHERAPY.

CHAPTER I.

HISTORY OF HYDROTHERAPY.

Hydrotherapy had its birth in the mists of antiquity, for bathing is probably as old as the hills themselves. From the most ancient of times water has been used as an agent in the treatment of disease, probably because it is so universally found, is easy of application, and because of the relief which has been so frequently obtained by its use. The ancient Hindus, Persians, Hebrews, Egyptians and Greeks, all employed water in the treatment of various diseases, and in the Vedas of Susrotas water is often spoken of as an article of treatment and as an antidote, the number and time of the bath being exactly regulated. That they attached importance to the subject is shown by the minuteness of detail which is given. The Magi of the Persians and Chaldeans utilized water in their therapeutic practice, and, as we read of holy wells in the neighborhood of their temples, it certainly played no unimportant rôle. The ancient Egyptians worshiped the Nile, as the Hindus did the Ganges, and they thought that bathing in its waters served to promote fertility alike in the land and in sterile women.

It was in Greece that water first reached its highest repute; and here Homer sings of bathing; Hector, wounded, finds recovery by means of water. In the midst of groves near springs, temples were erected in honor of Asklepios, the Greek god of the healing art; they were always located in airy, sheltered, healthy places, and were prototypes of the modern sanatorium. They were distinguished from other temples by their simplicity and spaciousness. The temple proper was usually very small, containing merely the statue of Asklepios, sometimes accompanied by his daughter Hygeia. This was surrounded by open colonnades where the suppliants gathered. There was always a sacred spring at the entrance to the temple. As the god was said to have been born in Epidaurus, the temple there was the most extensive of all. The walls were lined with bas reliefs, some still well preserved, portraying the return to health, or gratitude for recovery, of the flocking pilgrims, or of entire cities. The temple contained also statues of the healed persons, or of the healed part

of the body, statues of the head, hand, foot, breasts, shoulder, hip, etc., classified as to groups, which must have given the temple the appearance of a pathologic museum. Other votive offerings, urns, vases, seats, filled some of the rooms, and hung from the ceilings, some of them costly gold and silver articles set with jewels, which were despoiled later by the Roman conquerors; the temple is now an empty ruin. The priests who had charge of these temples acquired a certain insight into the medical sciences in time, and were able to cure many of the applicants. They refused to admit persons with contagious diseases, or in an advanced stage of any disease, and it was forbidden to deliver a woman even in the environment of a temple. Aristophanes gives a graphic description of the application of a sick person for relief. He first had to bathe in the sacred spring, and then make an offering to the god. Each party had to supply his own wants, as the temple offered nothing but a bed of dried leaves under the colonnade. The priests, as darkness approached, went through a certain ritual to impress the patients with a sense of mystery and of the nearness of the god. The priests advised certain gymnastics, riding, hunting, and similar sports; in others, cheering music, singing, etc., hydrotherapy, including running barefoot in the grass, and numerous hygienic and therapeutic measures. Thus it was that mystical methods of prayer, and cleansing, and strict fasting, prepared the devotee for the application of the cold water cure. Here it was that Hippocrates,[1] the father of systematic medicine, was first fired with enthusiasm by a perusal of the votive tablets, and undertook the study of this agent with a view to its systematic use for medical treatment. Hippocrates belonged to the tribe of the priests of Asklepios, but emancipated himself from its methods and teachings. "He was the first to maintain that cold water warms, while warm water cools the body. He was acquainted with the shower bath and shampooing, and showers to induce sleep. Cold water poured over the body he found useful in fainting. He treated tetanus with showers, and in affections of the joints he recommends the pouring over of cold water as being useful in relieving the pain and curing the affection . . . Elevation of temperature was known to him as a symptom of fever, and he recommended the use of cold water against the different varieties of it."[2] That he had an excellent understanding of the physiological action of water is readily appreciated when we find that he directed cold baths to be of short duration, preceded and followed by friction, thus showing that he understood the advantages of prompt reaction.

Asclepiades of Prusa, in febrile diseases, ordered cold water to be drunk, and repeatedly praises the value of the cold bath, of the

1 See illustration. Courtesy of Insurance Medical Journal.
2 Winternitz, Wm. "Hydrotherapy," Vol. IX, Ziemssen's Cyclopedia of Therapeutics.

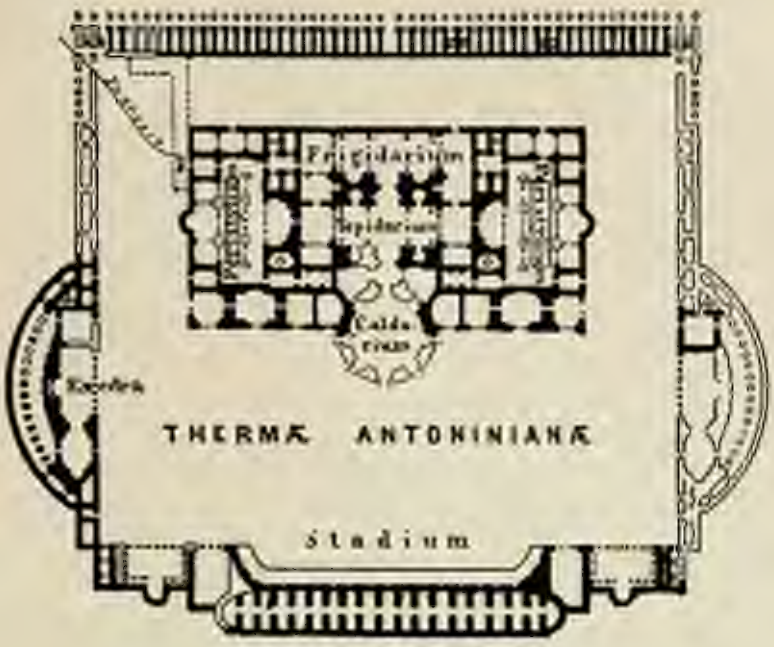


PLATE I—Baths of Caracalla



PLATE 2—Strigils

Courtesy Metropolitan Museum of Art, New York City

douche, rain baths and shampooing. In Rome, cold water treatment obtained a permanent place in the science of medicine, owing to the fact that Antonius Musa cured the Emperor Augustus by means of its application. But it was in the degenerate and luxurious period of Cæsarean Rome that bathing reached the maximum of its ancient usage. From a personal study of the great Thermæ of Rome and Pompeii, the writer was astounded at their extent and the perfection of equipment of these most ancient bath houses. The Thermæ of Caracalla, or Antoniniane, were erected about 212 B.C. by the Emperor Caracalla, and completed by Severus. Their magnificence was unparalleled, and of such extent that they could accommodate sixteen hundred bathers at once. They were built mostly of red and orange-colored brickwork, and were supplied with water from the Antonine Aqueduct, which brought water to the baths for that special purpose. The object of their erection by the emperors was to ingratiate themselves with the people; and in the construction of these enormous buildings they equipped them with private bathing apartments, gymnasia, libraries, and sometimes even theatres. This establishment was quadrangular in form, surrounded by a wall, had its porticoes and race course.

The technical effort displayed by the Roman architects, in rendering impervious to moisture the walls and sides of their reservoirs, in constructing flues for the conveyance of hot air, and in conveying and heating water, showed a skill of the very highest order. The water was heated ingeniously. The heat which was not taken up by the first boiler passed on to the second, and, instead of being wasted, helped to heat the second—a principle which has only lately been introduced into modern furnaces. We enter first (see cut) the spacious oblong surrounded by columns (peristyle), and from there the bathers retired to the Spoliatorium, where they undressed. From here the bather entered the Tepidarium, where he remained for a short while, then passed into the Unctuarium, to be anointed with oils or unguents, and then into the Calidarium, or hot-air bath. From the Calidarium the bather entered the Sudatorium, or sweat room, which usually had large vessels containing hot water, from which the bathers sprinkled themselves while rubbing off the perspiration. The temperature of the Sudatorium was regulated by drawing up or down a metallic plate. The richer Romans used a variety of oils and pomades (unguenta); they scarcely had true soaps. The poorer class had to be content with the flour of lentils, an article used in this day, for the same purpose, by Orientals. The most important bath utensil was the strigilis, a curved instrument made of metal, with which the skin was scraped and all sordes removed.

After this he proceeded to the Solium, or cold bath, from which he emerged to be rubbed and anointed.

"Petronius woke only about midday, and, as usual, greatly wearied. The evening before he had been at one of Nero's feasts, which was prolonged till late at night. For some time his health had been failing. He said himself that he woke up benumbed, as it were, and without power of collecting his thoughts. But the morning bath and the careful kneading of the body by trained slaves hastened gradually the course of his slothful blood, roused him, restored his strength, so that he issued from the elæothesium, that is, the last division of the bath, as if he had risen from the dead, with eyes gleaming with wit and gladness, rejuvenated, filled with life, exquisite, so unapproachable that Otho himself could not compare with him, and was really that which he had been called—*arbiter elegantiarum*." (Sienkiewicz, "Quo Vadis.")

Bathed, anointed, perfumed, in state and stately toga, he might then enter the Stadium and mingle with the literati and philosophers, listen to their discourses, and discuss the latest news. Such was the magnificence and luxury of these Thermæ that one stands almost lost in the contemplation of their ancient grandeur.

An idea of the magnificence of these baths may be obtained by a glance at some of the statuary taken from the Thermæ, and known as the Farnese collection—the Bull, the Hercules, and Faun—also the Torso Belvidere, a statue so perfect in its anatomy that Michael Angelo declared that he owed his power of representing the human form divine to its lines, and who, in his blind old age, used to be led up to it that he might pass his hands over its surface and still enjoy, through touch, the grandeur of its muscles.

"The walls of the lofty apartments were covered with curious mosaics, that imitated the art of the pencil in elegance of design and in the variety of their colors. The Egyptian granite was beautifully encrusted with the precious green marble of Numidia. A perpetual stream of hot water was poured into the capacious basins through many wide mouths of bright and massive silver; and the meanest Roman could purchase, with a small copper coin, the daily enjoyment of a scene of pomp and luxury which might excite the envy of the kings of Asia." (Gibbons, "History of the Roman People.") Perpetual streams of water poured forth on all sides from the mouths of lions of bright and polished silver. "To such a pitch of luxury have we reached," says Seneca, "that we are dissatisfied if we do not tread on gems in our baths."

"Consuls, emperors, and the great men of every age have found no better way of immortalizing their memories than by the shifting, indestructible, ever-new, yet unchanging, up-gush and down-fall of water. They have written their names in that unstable element, and proved it a more durable record than brass or marble." (Hawthorne, "Marble Faun.")

"The habits of luxury and inertia which were introduced with the magnificent baths of the Emperors, were among the principal



Plate 3—Farnese Statuary: Hercules, Bull, Faun.

causes of the decline and fall of Rome; and the vices which were encouraged in the baths found their reaction in the impression of the early Christians that uncleanness was a virtue, an impression which is retained by several of the monastic orders to the present day. Thousands of the Roman youth frittered away their hours in these magnificent halls, which were provided with everything which could gratify the senses." (Hare's "Walks in Rome.")

Galen,[3] that bright light of medicine, was an able advocate of baths, especially of cold water, and advised cold affusions to the head while the body was immersed in warm water. Following Galen came the period of the Dark Ages, when every form of knowledge suffered from fraud and ignorance, and during which the whole world met with an irreparable loss in the burning of the great library at Alexandria. During this time medicine, science and art were lost; the great Roman Empire was rent asunder, plundered by the northern hordes, and it is not until A. D. 525 that we find any evidence of a real luminary on the hydriatic horizon. Rejecting all systems of medicine, Alexander of Tralles insisted, "with a true philosophical spirit, which would do credit to him to-day, that the physician must depend in each single case upon the age, constitution, and natural powers and mode of life of the patient, as well as upon the climate and allied conditions and effects of nature." He believed in the pouring upon the body of cold water, and in friction.

Drawing the curtain of charity over the dark and barbaric Middle Ages, in which medicine, and with it hydrotherapy, suffered greatly, we come to a period when glimmerings of intelligence appeared in the distance. In the hands of quacks and charlatans, mixed and mystified by magical arts, hydrotherapy had fallen into shameful disrepute until the great surgeon, Ambroise Paré,[4] undertook its reformation. With unabated zeal, with acute and accurate observation, by hard labor, he investigated its merits, especially in the treatment of wounds and fractures, and said: "I declare that it is not the words (of the incantation) nor the cross which do it, but the water which cleanses the wound, and protects the injured limb from inflammation and the attack of other fluids, by its coldness" (A. Paré, edit. Malgaigne, quoted by Winternitz). Passing again into a state of innocuous desuetude, hydrotherapy was not aroused from its lethargy until the advent of Floyer's work, which came out in London, in 1697. He was an educated English physician, and his books passed rapidly through six editions, making many converts at home and abroad. He gathered in his books the data of preceding writings, both sacred and profane, and spoke favorably of the cold bath, and

3 See illustration. Courtesy of Interstate Medical Journal.

4 See illustration. Courtesy of the Librarian of Congress, from a stipple engraving by Wm. Hall, from the original picture in L'Ecole de Medecine (Paris). In the Portrait Gallery of distinguished poets, philosophers, etc. London, 1834. Vol. I, page 155.

ascribed the increase of disease to the neglect of its use. He recognized the advantage of making the patient sweat before taking the cold bath, and used wet sheets and blankets to bring this about, a method frequently employed at the present day, under the appellation of the "wet sheet pack."

Floyer's writings and work began to make an impression upon the medical fraternity of Germany, and one of the first to appreciate it at its true value was the illustrious Friedrich Hoffman, at that time one of the foremost clinicians of Europe; he attached much value to the medicinal action of water. Examining critically into the value of mineral waters in general, he came to the conclusion, which is most generally held at the present time, that the action of them is almost entirely due to the *pure water* they contain.

In his observations and researches he noticed the behavior of tissues to the action of cold water, and was the first to call attention to the fact that tissue tone could be brought about by these applications.

The writings of this highly educated and philosophic physician left their imprint upon the medical thought of his day, and while he did not place its use upon any scientific or rational basis, yet he brought its advantages to the notice of, and made them clear to, the thoughtful and appreciative physicians of his time.

The Japanese have used water in the treatment of disease for many years, and it is stated that Dr. Nakagami, three hundred years ago, recommended its use, particularly in mental and nervous diseases, while the same authority states that the cold bath has been in use in Japan for nearly eight hundred years, especially among the native country physicians.

In 1786 James Currie[1] became much impressed with the importance and results to be obtained by the application of hydrotherapy, and was attracted to its use through the publication of a fellow-countryman by the name of Wright. Possessed of a naturally philosophic and critical mind, and being a practical physician, it was not long before he discovered many important principles relating to hydrotherapy. He carried out quite a number of physiological experiments, watching each case carefully, and controlling each move in his treatment by means of thermometric observations. He was fond of prescribing the free drinking of large quantities of cold water, and did not become so enamored of his new practice as to forget the use of medicine, hygiene and dietetics. He employed cold water in the different forms of the exanthemata, paralysis, tetanus, convulsions, etc.

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1 See illustration. Courtesy of the Librarian of Congress. From a stipple engraving by William Thomas Fry, from a miniature by Thomas Hargreaves, in the British Gallery of Contemporary Portraits. London, 1812. Vol. I, page 71



Plate 4—Hydrotherapeutic Masters.

Perhaps the modern birth of hydrotherapy took place with the advent of Vincenz Priessnitz.* A Silesian peasant, born in 1799, he began early in youth to adopt cold water applications for the treatment of sprains, contusions and swelling of horses' feet, using compresses and bandages. He was peculiarly gifted with a clear insight, marked seriousness and genuine talent, and was much above the average of his countrymen, having received a fairly good education. He was unfortunate enough to sustain a fracture of two of his ribs, and as the local country authority could not bring the broken ribs into a proper position, and when he became aware that he would have to face long suffering and deformity, Priessnitz determined to effect his own cure. "With the energy so natural to him, he first of all pressed his chest against the corner of a chair, and, holding his breath, he then brought the two ribs in position with his hands, fixing them there by means of a dressing formed of towels steeped in cold water; then he drank water copiously and repeatedly, and found himself cured in a short time." While his methods were crude, and administered without much discrimination, we can pardon this when we realize that he possessed no physiological knowledge, nor had he the advantage of a medical education, or even being medically well read.

He soon began to organize his various measures and remedies into a system which, though crude and empirical, yet resulted in such success as to compel attention from far and wide. In many instances his successes were phenomenal, particularly as he treated every one in the same manner, without regard to age or sex, and without attempting a diagnosis of their disease. His routine method of treatment was to place his patients upon a rough, coarse, though non-irritating diet, compelling considerable muscular exertion, the drinking of large quantities of cold water, and the different external applications of this agent. For the latter purpose he used general and local baths, douches and friction, compresses and packs, some of the latter lasting as much as six hours; and we find, about 1840, "that he could accommodate 1,576, which number grew yearly by new-comers from every part of the globe." He had to undergo the usual scoffing of the medical fraternity, but his lay success was such as to finally draw critical attention to his methods, and he thus paved the way for educated physicians to take up the study of this important remedy, among whom was the noted French physician Fleury, who later published an extensive practical treatise upon the subject.

Priessnitz was not, as he is believed to be, the father of hydrotherapy. On the contrary, we find Hallmann stating, in the preface

* Art Illustration. Courtesy of the Librarian of Congress, from a wood engraving in Harper's Magazine, Vol. LX, page 187, in connection with an article on "The Isms of Forty Years Ago."

of his work, in 1843, that "thrice already has hydrotherapy offered its service to medicine."

Currie announced the new study, and gave it a capital recommendation; it was listened to by many, studied by few, and finally forgotten by all. Hufland, twenty years later, tried to obtain a hearing for it. Still twenty years later, it again spoke through the mouth of a layman, Priessnitz. Hydrotherapy is no enemy of medicine; on the contrary, it prides itself on being the daughter of the old Hippocratical medicine, and promises to be a powerful ally to its mother.

The cuts give an idea of some of the local and general applications of water that Priessnitz used, and which his mechanical ability enabled him to change or modify at will. Thus, medicine was once again to be compelled to accept a remedy far more valuable than nine out of ten medicinal measures, through the insistence, persistence and unquestionable ability of an ignorant but astute layman. Too often has this been the case, and alas! it is sometimes true in the present day and generation.

Henry visited Priessnitz, and was so much impressed by the results obtained by this empiric, that he returned to France to take up the systematic and careful study of hydriatic methods. His aim was to examine carefully into the physiologic and therapeutic value of each procedure, and it might be stated that he founded almost a separate school by the introduction of the "douche." He was a keen observer, a thoughtful man, and fortified his deductions by clinical results.

In 1848 he published a work devoted to the douche and its application in intermittent fever, to be followed afterward by a treatise in which he showed the great value and success of the treatment of pseudoankyloses, chlorosis and scrofula by the same means. It is astonishing to note the results he obtained by this method.

In 1850, Hollman, a scientifically educated physician, studying the the results obtained by Priessnitz, became converted and entered upon the use of hydrotherapy. He sought to induce perspiration, in addition to the abstraction of heat, by wet packing.

To Becker must be given the credit, at this time, of the most complete experimental investigation of the internal administration of water, which led to the law that the excretion of urea increased during the copious drinking of water, while the formation of uric acid is diminished, together with a diminution of the chlorides and phosphates.

In 1861, Ernest Brand, of Stettin, published the details of his now well known and celebrated treatment of typhoid by baths at a temperature ranging from 50° to 68° F. It would be impossible, in a historic review, to more than mention the studies, labors and results



PLATE 5—The Early Methods of Treatment (Kellogg).

of Brand, and this matter will be entered into more fully and in detail when the consideration of the treatment of typhoid fever is taken up.

Suffice it to say, however, that his studies and treatment clearly showed that the cold bath treatment lowers the body temperature, diminishes the grave symptoms, refreshes and strengthens the nervous system, probably shortens the course of the disease, and lessens the mortality.

In 1863, Dr. John Chapman, an Englishman living in Paris, founded the application of the spinal ice-bag upon a law that "paralysis of the sympathetic nerves brought on dilatation of the vessels they supplied, and, consequently, peripheral hyperemia, with real increase of temperature; whilst irritation of the sympathetic ganglia brought about contraction of the blood-vessels, and, consequently, anemia and lowering of temperature." They became of some value in the treatment of spinal and nervous diseases.

It was, however, to Professor William Winternitz,[7] of Vienna, Austria, that the credit of placing hydrotherapy upon a scientific basis is due. This investigator brought to his work full knowledge, a discerning mind, and an enthusiasm that knew no bar, nor allowed any difficulty to prevent the accomplishment of his purposes. His studies upon the influence of hydrotherapy upon metabolism, the blood, excretion, the application of heat and cold, are monuments of scientific care and pains, while his deductions show the logic of a true investigator, a mind of broad gauge and ample qualification. It was through his investigations that we are able to know definitely that the influence of cold water procedures upon the nervous system was a stimulus, a fact of much more importance than the mere physical action of loss of heat. With this knowledge at his command, he began to study and make use of hydrotherapy in the treatment of the different forms of disease that came under his care. It was, however, not until 1876 that he published his work, and described fully the influence of hydrotherapy on the circulation and innervation. The author here acknowledges not only his indebtedness to the classic studies and works of Prof. Winternitz, but he owes to the personal charm of the man his first desire to study and investigate this method of therapeutic procedure. The observations made at his clinic remain fresh and strong among the many recollections of his student life. It was through Winternitz's work and influence that Vienna has become the great modern center of hydrotherapy, and from which many of the successful results of treatment have originated.

Among modern physicians, Dujardin Beaumetz has placed the stamp of his approval upon the use of hydrotherapy in its many

7 See Hampton, Century of Modern Medicine and Bacteriological Review, June, 1902.

forms. There are few will gainsay the experience and judgment of Prof. Erb in the treatment of disease within his specialty (nervous diseases), and an expression of opinion from one who is entirely freed from the vice of using a single therapeutic method must be doubly felt when we read his statement made in Von Ziemssen's Cyclopedia, as follows:

"To the most important and most active therapeutics of our field belong cool and cold baths, viz., the application of cold water in its most varied forms, that which is usually termed 'cold water treatment.' Its results in all possible forms of chronic nervous diseases are extraordinarily favorable. If we add to this the heightened skin and muscular action induced by various methods of bathing, it becomes evident that we possess few remedies which produce an equally powerful effect."

Of recent years American physicians have taken up the subject of hydrotherapy and its associated procedures, and have constantly impressed their value upon the profession of this country.

No historical review of hydrotherapy would be complete without a tribute to two American masters in this department—J. H. Kellogg and Simon Baruch. These men, above all others, have stood for the honest, scientific and practical application of water to disease. They, much more so than the author, for they have worked longer in the pioneer field than he, can recall all the difficulties and all the prejudices that met their early efforts. They have, fortunately, lived to see the day when the profession is awakening to view as they did a valuable and powerful therapeutic weapon. Their studies and contributions, covering three decades, will ever be an honor to American hydrotherapy.

Hydrotherapy has seen its ups and downs, its periods of fluctuation, its cycles of existence and non-existence. In ancient times it was used only to be lost, and later revived to be lost again. In modern medicine hydrotherapy has come to stay, and, were I to predict, I would certainly say that it will never again reach the shades, nor depart from the usage of intelligent physicians. To-day the medical profession is too broad in its beliefs to permit the extinction or loss of any procedure by which results may be obtained; and, having been freed from empiricism, and built upon the strong bulwark of physiological study, we may hope that the intelligent medical man will never again allow it to be lost sight of, but will use it as one of the most powerful and satisfactory of therapeutic resources.



Plate 6—Early Methods of Prisoner (Kellogg)



Plate 7—Early Methods of Prisonic (Kellogg).

CHAPTER II.

GENERAL CONSIDERATIONS.—ANATOMY AND PHYSIOLOGY OF THE SKIN.

Hydrotherapy is the application of water in or upon any part of the human body for remedial purposes. It is a remedy that requires a thorough and practical knowledge of anatomy and physiology. When properly handled and in experienced hands, it is an agent capable of producing results not equalled by any therapeutic procedure in the domain of medicine. In its application, not only is it necessary to know physiological function, but the pathological modification of tissue resulting from disease. Of all physicians, the hydrotherapeutist should possess an accurate knowledge of the anatomy and physiology of the nervous, skin and blood-vascular systems.

The author, while possessing the most thorough appreciation of the advantage and value of hydrotherapy, fully realizes that it is not a cure-all, nor is it intended to convey such an idea. The great tendency of enthusiastic therapeutists to lean upon one single method of procedure cannot be too heartily condemned, and it is with a full comprehension of the real value, and the limitations of this agent, that this book has been written.

It will be noticed, especially in the therapeutic portion of the volume, that other methods are suggested as of primary importance, and water as its corollary, and *vice versa*. Too often enthusiasm has carried the user of water far beyond the domain of truth, and it is here again reiterated that its true and full value is developed only in the hands of those who bring to it a just and scientific appreciation of its limitations.

It is an agent that is, or should be, in daily use from birth until death, and not only is it of value as a remedial measure, but it is a useful agent in the preservation of health. Its application in the treatment of disease is an art, and can be acquired only by the exercise of experience. Its haphazard, desultory and careless application is just as much contraindicated as the same method would be in the prescribing of drugs. Correct diagnosis, an appreciation of the clinical indications, and a full knowledge of the physiological action of the agent used, are necessary to its proper use. Many methods, especially in acute and subacute diseases, require little, if any, apparatus; and, in fact, in many of the best applications in these conditions, the paraphernalia can be found in any household, even the kun-

best. It is in the domain of chronic diseases and disorders that the more bulky and non-portable apparati are needed, and these are to be found in institutions devoted to the treatment of this class of sufferers.

The Physical Properties of Water.

Water is a constituent of every tissue of the human body, from 0.2 per cent. in the enamel of the teeth to 99 per cent. in the tears. It is necessary to the performance of every function of the organism. In its fluid-like form water lends itself readily to applications to the body. The physical changes to which it may be subjected run from 32° F., ice, to 212° F., steam, when, under ordinary circumstances, it attains a volume seventeen hundred times greater, and becomes quite elastic. It can thus be readily seen what an enormous opportunity is offered in its application to the periphery of the human body, both for general and local effects. It possesses cleansing and antiseptic properties, and this is one of the principal uses in ordinary application. The physical properties of water in its hydrotherapeutic application consist of the following:

1. *Thermic Action.*—Water absorbs more heat for a given weight than any other substance, and communicates this with great rapidity to objects with which it comes in contact, and therefore it is readily adapted for making applications of varying temperatures to the human body. The ease and rapidity with which we may vary the thermic influence adds to its efficiency. General therapeutic applications may be made between the temperatures of 34° and 120° F.; locally, 34° to 160° F.; a range of temperature effects unobtainable and unequalled by any other known remedial measure.

2. *Mechanical Effects.*—Water, possessing a certain weight, makes it possible under pressure to obtain vibratory or mechanical effects that are extremely valuable to the hydriatist. The forcible impact of water of varying degrees of pressure, influences by its mechanical action the peripheral nerve endings and blood supply, independent of the thermic action.

3. *Adaptability.*—The ease and rapidity with which this agent may be changed and varied in a precise and certain manner, so that the attendant has under his control, within a few seconds of time, the temperature, pressure, form of application, and duration, renders it, without question, the remedy *par excellence* for these effects. Its form, size, weight and fluidity being under perfect control, makes it adaptable to any and all portions of the body with a precision and satisfaction offered by no other thermic agent.

4. *Cleansing, Antiseptic Action.*—There is no agent equal to water in its cleansing action, and the daily bath is, as a rule, part and parcel of civilized mankind's daily routine. As an antiseptic, pure water

finds its uses innumerable in the surgical and medical field, while internally it is not only an antiseptic, but a diluent.

It may be stated that water, when properly used, keeps the body in health, prevents the onset of disease, resists the attacks of pathogenic bacteria, and is, as Hoffman says, "more nearly a panacea for human ills than any other known agent."

Anatomy of the Skin.

As scientific therapy of any kind should be based upon anatomical and physiological considerations, it is necessary to first consider the structures and functions of the human skin, it being the principal organ to which water is applied. The skin is tough, flexible and highly elastic; it consists of fibro-areolar tissue, contains blood-vessels, lymphatics, glands and nerves. It is the principal seat of the sense of touch, and is an important excretory organ, containing, as it does, the sweat and sebaceous glands.

The skin consists of two layers:

1. The corium, or cutis vera.
2. The epidermis.

It is closely connected to adjacent parts by means of the subcutaneous cellular tissue, into which the follicles of the hair and the different glands of the skin project.

The true skin consists almost entirely of fibro-areolar tissue; the firm white fibrous tissue forming with the yellow elastic fibers a strong framework for the structures of the skin. This tissue is most abundant in the lower layers of the corium, becoming finer toward the surface.

The areolæ form channels by which the blood-vessels, nerves, glands, etc., are distributed superficially, and the interspaces between these are usually occupied by fat cells. Unstriped muscular fibers, abundant in the upper portion of the cutis, are usually located around the hairs. Situated near the free surface of the true skin is the papillary layer, consisting almost entirely of blood-vessels. These papillæ, or projections, rise perpendicularly to the surface, and are highly sensitive.

Their number and distribution vary proportionately with the sensitiveness of the skin; that is to say, the more sensitive portions being supplied very much more richly with papillæ.

The larger and smaller papillæ contain a capillary loop, convoluted to a greater or lesser extent, and in addition one or more nerve fibers, in some sections intimately associated with the "tactile corpuscles."

The epidermis, or scarf skin, consists of many layers of stratified epithelium, molded or cemented together. These cells are of various sizes, shapes and hardness, the inner layer being soft and the outer

hard. The superficial cells of the epidermis are being constantly thrown off and their place taken by the newer cells of the deeper structure. These external hardened and flattened cells are removed in great numbers after a bath followed by friction. The epidermis serves as a protective layer to the cutis, and prevents and limits evaporation from the blood-vessels which come close to, or against, its inner margin. It presents on its surface lineal markings or furrows of variable size and disposition, the projections between the furrows depending upon the peculiar arrangement of the papillæ.

The blood supply of the skin is derived from arteries located in the subcutaneous tissue, numerous branches of which pass through the areolæ of the cutis, dividing into dense capillary plexuses, from which numerous twigs ascend perpendicularly into the papillary layer. It is from this network of capillaries that the glandular structures and the hairs are likewise supplied.

The gross nerve supply to the skin is derived from the cerebro-spinal system, and consists of medullated and non-medullated fibers. They are distributed over the entire skin in relation to the different spinal segments. The nerve fibrils form a plexus in the corium, and from this plexus neuraxons ascend to be distributed to the papillæ, and to terminate in the corpuscular bodies associated with sensation. Fibrils are distributed to the hair follicles, sweat and sebaceous glands. The nerve supply of the skin is most extensive, among which are fibrils that govern temperature (heat and cold), touch, pain, and the vasomotors.

The sudoriferous or sweat glands are found in enormous numbers opening upon the surface of the skin. They are about 1-56 of a line, and their total number is estimated by Krause at 2,381,248. They vary in number per square inch, from 417 on the neck and back to 2,800 on the palms of the hand. They are found in the small pits in the corium, and extend deeply into the subcutaneous cellular tissue, being totally surrounded by a quantity of adipose tissue. They are lobulated bodies consisting of convoluted tubes, from which a duct proceeds through the true skin and opens upon the surface of the epidermis. The duct is usually spiral in its course, and opens upon the skin in a more or less oblique or valve-like manner.

The sebaceous glands are found in the cutis projecting into the subcutaneous cellular tissue. These are small racemated glandular organs, consisting of a single duct which terminates in a more or less racemose manner or in a lobulated pouch-like extremity. The duct is lined with epithelium and usually filled with particles of sebaceous matter, which constitute its secretion. The ducts open mostly into the hair follicles, but in some positions, as in the face, directly upon the general skin surface. These glands are most abundant in the scalp, face, and especially around apertures where there is a



Plate 8—Microscopic Section of Skin.



Plate 9—Microscopic Section Showing Skin Circulation

junction of the skin and mucous membrane; they are absent upon the palms of the hands and feet.

Physiology of the Skin.

The physiology or function of the skin may be considered as follows:

1. As a protective covering.
2. As a sensory organ.
3. As an excretory organ.
4. As a vascular organ.
5. As an organ for the regulation of heat.

1. *Protective Covering.*—The skin and its subcutaneous cellular tissue not only fills up depressions, covers projecting points and increases the cosmetic appearance of the body, but serves as a firm, easily movable and soft elastic pad to protect delicate and sensitive spots from external and mechanical injury. The epidermis, being a dry, horny substance, devoid of nerves and blood-vessels, acts as a resistive body to the entrance of foreign substances from without. Its pressure upon the capillaries in the papillary layer prevents evaporation and too great a diffusion of liquids. The epidermis is a bad conductor of heat, watery vapor and electricity.

2. *Sensory Organ.*—This is, of all, the greatest function of the skin, for by means of the nerve endings terminating upon the surface of the skin, it serves the purpose of bringing the human organism into contact with, or conscious of, the external world. Through its nerve supply we are capable of feeling the contact of objects with the skin (touch or tactile sense), the varying degrees of thermic change (temperature sense), disagreeable and painful sensations (the pain sense). Tactile sensation, or the sense of touch, as previously mentioned, is mostly served through utilization of the touch corpuscles of Wagner and Meissner, Pacini and Golgi. These nerve terminations are capable of recognizing specific sensations of all kinds. So intimately are the nerves disposed, that in all portions of the body the slightest touch with a fine cambric needle is not only appreciated, but pain as well as touch is felt.

Modern investigators now separate the nerve endings into distinct and specific points for the recognition of the different sensations, and believe that there are specific end-organs which appreciate the varying sensations of touch, locality, pressure, pain and temperature. The intimate association of the skin with the cerebro-spinal and sympathetic systems of nerves makes the skin an organ capable of producing the profoundest reflex influences upon distant organs and functions, and, as it is constantly exposed to varying conditions of irritation, so does it produce varying influences upon different portions of the body by means of its referred and reflex action. The

study of the minute anatomy of the spinal cord lends additional belief to the view here expressed, that these sensations are subserved by different nerve fibers, which are ultimately gathered into the different columns functionally related to these sensations. However, it may be said that the sensations of the cutis, while different, are yet closely united, and that the neural mechanism of the skin is distinctly a conjoint and complicated one, with difficulty of separation, so far as its sensory impressions are concerned. The sensibility of the skin is greatly influenced by certain conditions, which should be borne in mind by the hydriatist.

Exercise and moistening of the skin increase its acuteness and activity. The temperature sense of the skin is very much more acute, rapid and exact for cold than for heat; in fact, heat sensations are, as a rule, developed slowly and less accurately. Sudden change from one temperature to another, especially from heat to cold, is felt more acutely than the reverse; the application of heat followed by that of cold is of a more stimulating effect than *vice versa*. Temperature, especially cold, is felt more acutely if it is accompanied by weight or pressure, and may reach such a point as to be in either event painful. The terms heat and cold are purely relative; a body possessing a sensation of warmth when heat is communicated to the skin, and is felt as cold when it robs the skin of heat. The body appreciates varying degrees of temperature in proportion to the richness of the nerve supply. Practice develops the temperature sense, and brings forth a more accurate and acute appreciation of its influences. When large areas of the skin are brought in contact with bodies of varying temperature, the sensation is felt more sensibly than if the area is small.

Pain may occur whenever a strong stimulus is applied to a sensory nerve. All kinds of stimuli may produce pain provided they are stronger than normal; thus, mechanical, thermic, chemical, electrical or somatic disturbances may produce pain. The intensity of the pain usually depends upon the excitability of the sensory nerves, the extent of the stimulus and its degree.

3. *Excretory Organ.*—The most important secreto-excretory functions of the skin are (*a*) sudoriferous, (*b*) sebaceous, (*c*) respiratory.

Sweat, the secretion of the sweat glands above described, is secreted in the coil of the gland, and finds its exit upon the skin. Under ordinary circumstances it is secreted in such quantities that when it reaches the surface of the skin it is at once evaporated, constituting what is known as insensible perspiration, amounting to one or one and one-half ounces per hour. Under certain conditions, however, as exposure to external warmth, exertion, nervous impressions, and in some diseases, the secretion increases rapidly, collects in the form of drops on the external surface, is then known as



PLATE 10—Microscopic Section of Skin, Showing Sebaceous Glands.



PLATE 11—Microscopic Section of Skin, Showing Glandular Structures.

sensible perspiration, and may amount to as much as thirty to fifty ounces per hour. The most active secretory portions of the body are the palms of the hand, the cheek, forehead, soles of the feet, breasts and upper arm. Perspiration is favored by the agencies mentioned above, and also by the free drinking of fluids, especially water; external applications of alcohol diminish the quantity. Sweat is alkaline in reaction, but becomes acid, owing to the admixture of fatty acids and decomposing sebum. The quantity secreted has something to do with its reaction; the more profuse the perspiration the nearer does it reach a neutral reaction. It has a salty taste, a peculiar and characteristic odor, due to the presence of sebum in the sweat. The fatty acids found in the sweat, and influencing its reaction and odor, are palmitin, stearin, formic, acetic and butyric acids. Urea is also present in very small quantities. The function of this secretion is of great importance to health; a proper maintenance of its activity a *sine qua non*. The extensive glandular structures associated with this function permit of an enormous discharge. Anatomists have called attention to the close resemblance in the anatomical structure of the skin and kidney, pointing out the resemblance of the glomeruli to the coiled sweat glands, while chemists have noted the resemblance of perspiration and the urine. Bouchard has shown it to contain a powerful toxin, capable of lowering body temperature. It is a common and daily observation with clinical hydriatists that there is an intimate and close relation between the skin and the kidney, and that the former may become an important aid to the action of the latter. In pathological states the action of the skin is usually increased, a safety valve in those conditions in which the integrity of the kidney is threatened. The nervous system influences the secretion of sweat through the action of special secretory nerves accompanying vasodilators, the resultant of whose action is a red and congested skin followed by free action of the glands.

Adamkiewicz states that the dominating sweat center is located in the medulla oblongata. The epithelium lining the sweat glands after free perspiration becomes granular and the nucleus more central (Renaut).

Healthful activity of the skin is a condition most essential to physical well-being. The state of inactivity of this organ, found present in nearly all chronic maladies, is not only a consequence, but a cause of a large number of serious morbid conditions of the body. It is in a great majority of cases quite impossible to effect a cure until the skin has, by patient, persevering treatment and training, been brought into a healthy state. The dry, sallow, dingy skin is due to the accumulation of effete matters in it, and to its impaired nutrition.

The excretion of sebaceous matter keeps the skin supple and pre-

vents the hair from becoming too dry. It is slowly discharged from the excretory ducts of the sebaceous glands, and is composed mostly of fatty granules, a few gland cells and crystals of cholesterin. This excretion gives the perspiration its characteristic odor. The skin possesses respiratory functions. Roelarig believes that carbon dioxide and water are excreted from the capillary vessels in varying proportions, the exchange of gases depending largely upon the vascularity of the skin. It is a well-known fact that total suppression of cutaneous activity will cause death.

4. *The Skin as a Vascular Organ.*—An anatomical consideration of the skin shows it to be one of the most richly supplied of the organs with small blood-vessels, especially capillary ones, and it can be readily appreciated that any agent that will influence or change the blood stream from without to within, or *vice versa*, is an agent capable of exercising a profound influence both in health and disease. The small arteries and capillaries of the skin are elastic; consist of a single layer of transparent, excessively thin, nucleated endothelial cells joined to each other by their margins, and possessing the power of contraction and expansion. The small arteries and capillaries are nothing more or less than the terminal branches of the heart, and it is through these that the systemic circulation takes place. The great vascularity of the skeletal muscles and their close relation to the skin, aid materially in stimulating normal activity of the circulating stream through the cutaneous surface. The skin responds with promptness to any stimulant of a circulatory character, and particularly those influencing its nerve supply governing the diameter of its blood-vessels. The intimate relation between cardiac activity, blood pressure and vascular activity in the skin, is a matter that will be more extensively dwelt upon when we come to consider the action of water upon the circulation. It may be stated, however, that the muscular and cutaneous surfaces are capable of controlling and holding approximately 60 per cent. of the entire blood of the body. Hydrotherapeutic applications influence extensively the vascularity of the skin, and also the action of the heart and pulse.

5. *The Skin as an Organ for the Regulation of Heat.*—The origin of heat in the human body is to be sought for in the food ingested, principally those of non-nitrogenous bodies, oxidized within the body, mostly in muscular structures. The method of its production is that of dissimilation or destruction, in which oxygen is the oxidizing agent. Its production takes place in nearly all the processes that are necessary to the maintenance of health. Function is accompanied with more or less development of heat, the amount generated being related to the functional activity of an organ. Healthy, strong, robust persons generate more heat than delicate ones; more while actively exercising than when passive.

The body temperature is nearly constant, although it may be subjected to great external variations. Temperature impressions are conveyed over thermic nerves to centers located in the brain and spinal cord, which are in close and intimate relation with the vasomotor centers and those of the abdominal splanchnic nerve. These thermic impressions bring the blood to the surface, thus enabling the surplus heat of the internal viscera to be dissipated and lost by evaporation, conduction and radiation. The internal temperature is considerably higher than that of the surface, the equipoise of heat production and heat elimination being maintained by the skin. When the skin is brought in contact with a lower temperature, there is a contraction of the peripheral vessels, which, if the extent is sufficient, causes involuntary muscular movements. At the same time there is an active dilatation of the blood-vessels in adjacent parts, to prevent further entrance to cold. Reflexly, the heart action is strengthened, driving more rapidly the current of blood through the cutaneous surface and muscular structures underlying it. The musculature of the skin, reacting to cold, contracts and produces cutis anserina, or "goose skin." The thermic stimulation arouses the automatic centers located within the spinal cord and brain to increased production of heat, through stimulation or paresis of the inhibitory fibers. Perspiration is checked, evaporation prevented, heat retained, the skin becoming pale and the epithelium more dry.

The exposure of the body to a higher external temperature influences the thermic nerve terminations in the skin, lessening, through the inhibitory centers in the spinal cord and brain, the production of heat. At the same time impressions are conveyed to the automatic centers of the vaso-motor system, which results in the dilatation of the immense vascular area in the skin, accompanied by the contraction of the blood-vessels of the internal viscera. The superheated blood is thrown to the surface, the production of heat in the internal viscera lessened, and functional activity of these organs limited.

Perspiration breaks out closely related to the amount of thermic irritation, and the perspiration, evaporation and heat radiation counteract the unusual thermic excitement upon the surface. If the irritant is carried too far, a paresis of the blood-vessels of the skin takes place, and a congested state is the result. Owing to the slow circulation through the internal organs, less heat is produced, and the body protected against overheating. The heart's action is accelerated; the stream of blood is more rapidly and frequently brought from center to periphery, is thus cooled and recooled; not only is the circulating medium more frequently passing through the blood-vessels, but their dilated condition is favorable for rapid and prompt loss of heat.

Kellogg[1] says: "The surface over which the blood is spread is not

[1] Kellogg, J. H.: "Rational Hydrotherapy," 1877, p. 34.

fully represented by the seventeen square feet of skin surface, but rather by the 11,000 square feet of surface over which the capillaries are spread in the walls of the perspiratory tubules—six times the surface presented by the lungs." Respiration is more rapid, and heat loss favored by evaporation, from the large area presented by the pulmonary mucous membrane.

It will be noted that in the conservation of heat and its dissipation, the mechanism governing both is reciprocal, production and loss being the result of nervous action, maintaining an equilibrium by variations in the vascularity, secretion and functionation of the skin.

CHAPTER III.

PHYSIOLOGICAL ACTION OF WATER EXTERNALLY APPLIED.

The skin, anatomically and physiologically, is capable of standing abnormal changes and strains placed upon it. In order to appreciate fully the physiological action of hydrotherapeutic applications, it will be necessary to consider somewhat in detail the action of heat and cold upon the various functions directly resident in the skin itself, as well as effects upon distant organs, tissues and functions, the result of nervous or reflex action. These are brought about through the perturbation of the sensory nerve endings in the skin by thermic and mechanical stimuli, are conveyed to the central and sympathetic nervous systems, impressions that start in actions myriad minute responses within the nervous system itself as well as the body structures and functions. The sensory nerves thus become the hydriatist's medium of excitation.

Hydrotherapeutic applications may be used to influence and affect:

1. Temperature.
2. Circulation.
3. Respiration.
4. Metabolism.
5. Nervous system.
6. Muscular system.
7. Blood.

In addition to which we must consider:

8. Hydrotherapeutic reaction.
9. Contraindications.

Taking a *normal* or "neutral" line, the temperature of which ranges between 92° and 96° F., temperature effects are produced as we rise above or fall below this level, and it serves as a central or median place from which to classify baths or hydriatic applications. This neutral or normal temperature is so called because it does not disturb or perturbate the sensory nervous system, but shuts out all impressions, and by its negativeness calms the peripheral as well as the central nervous systems.

Starting, then, with the neutral or normal line, we base our classification according to temperature, which of necessity requires some latitude, and is more or less arbitrary and artificial.

Very cold	34 deg.	to	55 deg.
Cold	55 "	"	65 "
Cool	65 "	"	80 "
Tepid	80 "	"	92 "
Neutral, normal, line	92 "	"	96 "
Warm	96 "	"	98 "
Hot	98 "	"	104 "
Very hot	104 and above.		

"Man owes his relative constancy of temperature to great apparati of clothing, habitation, artificial heat by fires, stoves and voluntary movements, and the necessity for placing at the head of the list of all conditions subservient to the maintenance of life is that of warmth, which is even more important to be attended to than nourishment itself." (Samuel.) "No matter how manifold the measures may be which the nature of the more highly organized animals has endowed them with, in order to enable them to maintain the heat of their own interiors against the changes of external temperatures, and no matter how well they may understand by their instinct to support these measures, yet they only fulfill the requirements put to them within the very narrow limits of the most favorable conditions. Beyond these, as a matter of fact, the native heat to warm-blooded animals is wanting in that renowned stability which one has been in the habit of considering to be one of the most marvelous facts in nature. When we are in our clothing we are in the same condition we should be in if we were naked in a specific atmosphere at the temperature of from 24° to 30° C. (75.2 to 86° F.). The temperature of separate climatic regions between the skin and clothes, therefore, is a much more constant one than we might at first glance suppose, judging by the great difference of temperature between the blood, and compensated by fresh waves of arterial blood, connected to the part to which cold is applied, and the converse is true in extreme applications of heat." And that "the amount of temperature reduction depends more upon the intensity of the thermic irritation of the cutaneous sensory nerves than any other element," has been pointed out by Winternitz.

That the application of varying temperatures has its influence upon organic life, is well known to all physiologists, and is capable of easy demonstration. Most of us have observed under the microscope the slowing of the cilia of epithelium under cold, its stimulation by moderate temperatures of heat, and its suspension of movements by both extremes. A full knowledge of these responses, independent of mechanical stimulation, enables the hydrotherapeutist to play upon the skin in a marvelous manner. That cold diminishes vital activity, and that heat enhances it, is a daily observation. The essential effects of heat and cold upon the organism in health are practically the same when applied to pathological conditions, and its ability to produce normal responses in diseased tissues results in restoring to them their

lost equilibrium. Great latitude exists in different persons with regard to the appreciation of heat and cold. These impressions vary considerably in different parts of the body, and are influenced by the nervous condition, circulatory processes, and reactive capacity of the individual.

Physiological Action Upon Temperature.

The normal temperature of the human body is usually 98.6° F., but it may rise 5° in the month—to 99.1° F. Increased temperature may be induced physiologically by exercise, mechanical stimulation, thermic irritation, and may be augmented (or decreased) by many pathological states. Where thermic irritation causes a rise in temperature, this is brought about reflexly from irritation of the sensory nerves of the surface, carrying impressions and acting upon thermogenetic centers located in the medulla, governing automatic centers located in the spinal cord, these in turn having control of those tissues mostly concerned in the production of heat, that is, the muscles. These medullary centers may increase or decrease or inhibit the lower automatic centers. But reflex action is not the only way in which the nervous system is stimulated to regulate heat generation and loss. The surface blood, absorbing or losing heat, as the case may be, bathes the neurons in a blood of higher or lower temperature, as a result of which they respond. *Increased bodily temperature* may result from several conditions—(*a*) increased heat production, (*b*) decreased heat elimination, and (*c*) a combination of the two, both increased production and decreased elimination. This in hydriatics may be accomplished even by a warm bath of a few degrees of temperature above the body, or warm or hot air of varying temperatures. These produce their effects by preventing heat elimination from the skin, by conducting heat into and through the skin to the tissues below, thereby raising their temperature. The mere presence of heat stimulates vital activity and at the same time increases bodily production. Temperature is quickly raised by baths at 105° F. and over, Kellogg[1] having shown that there is a rise of 1° F. in bodily temperature for every 20° F. in the surrounding media. When the bodily temperature rises, the natural forces are aroused to meet the changed conditions, in an endeavor to eliminate heat. The intimate relation of the thermic centers with the vasomotors enables this to be done through their action upon the vascular system, by dilating the superficial blood-vessels and carrying more blood to the surface to be cooled; by contracting the visceral blood-vessels, lessening function and heat production; by accelerating the heart action so that the blood is more frequently passed through the superficial blood-vessels; by increasing the respiration so that the blood is oftener

1 Kellogg, J. H.: "Rational Hydrotherapy," 1901, p. 139.

cooled; by perspiration, in which heat is lost through conduction, radiation and evaporation, the last a distinct cooling method. It is eminently a blood vascular process.

Decreased bodily temperature may result from (a) decreased heat production, (b) increased heat elimination, and (c) a combination of both, diminished production and increased elimination. This decreased state cannot in hydriatics be produced by brief cold applications, reaction occurring and preventing the loss by all those changes incident to it. Short, brief methods reflexly stimulate the thermogenetic centers which accelerate the production of heat, especially in the interior, as well as in the thermogenetic tissues of the body, the muscles. This increased formation is retained in the body, owing to the contracted skin. Heat loss is lessened by the slowed heart action sending less blood to the surface; by checking perspiration and contracting the blood-vessels less blood is exposed; by diminished respiration, so that little evaporation occurs and less air needs heating.

The Physiological Action of Heat on Temperature.

The temperature at which water is recognized as being warm or hot commences at about 98° F., and ranges between this figure and 104° to 105° F., above which point all temperatures are hot. Temperatures of 120° in general applications are endured by some few persons, but are borne with difficulty by the majority of humanity.

As soon as the body is surrounded by a medium of higher temperature, the medium begins to lose and the body to acquire heat by conduction from the medium into the skin and tissues of the body. Being submerged in water even a few degrees higher than the body, prevents the usual heat loss from the skin, so that heat is retained from failure of the skin to eliminate it. The rise in body temperature is fairly proportional to the duration and temperature of the surrounding medium. This rise, ranging in my own observation from .5° F. to even 2° F., continues until the vital forces respond and throw off the effect.

As the tissues heat up and the surface temperature rises, the blood absorbs the heat, and this current, now superheated, sets in toward the thermic centers in the medulla and cord. These begin at once to respond in their endeavor to throw off the irritant, accomplishing this result by all those means that bring about heat loss. It may be stated that in health short applications make little change in the bodily temperature. Temperatures here named, between 98° and 120° F., apply strictly to water, and not to other media, for the body may, under proper conditions, be submitted to superheated dry hot air at from 300° to 400° F. With water, very much higher temperatures can be borne where they are local. In the application of higher temperatures, 130° F. and above, a transient pallor of the

skin takes place, accompanied by contraction of the smooth muscular fibers of the cutis, producing a goose skin effect. The sudden impact of very great heat may produce tremor and shivering. The increased temperature within and upon the skin results not alone in activity of the perspiratory glands, but the sebaceous glands are aroused to eliminate as well. The increased temperature of the body, it will thus be seen, results from heat conduction from the media into the tissues, and by the prevention of heat elimination.

As thermic impressions rise above and fall below the "neutral" level, we find extremes meeting, a very hot and a very cold application being interpreted as pain. In practice the hydriatist takes advantage of these temperature effects by first using a warm or hot application followed by a cool or cold one, in order that each may enhance the other. Where warm applications precede, cold is more acutely felt. When we have increased sufficiently the heat upon and within the skin and superficial tissues, cold rarely depresses, heat abstraction being prevented by the increased vascular, nervous and vital activities.

Physiological Action of Cold on Temperature.

Temperatures of water recognized as being cold commence at 92° and range between this figure and 34° F. Temperatures of 34° are borne by some few people, but the majority cannot, as a rule, stand 45° F. Very much colder temperatures can be used in local application. The first effect of an application of cold water to the skin is a refrigeration, pallor and chilliness of the surface, accompanied by a contraction of the superficial small blood-vessels.

Coincident with the contraction of the capillaries, the influx of blood into the skin is checked, through impressions made upon the sensory nerves and reflected along the vasoconstrictors. When contraction of the small vessels takes place, the circulation is decidedly diminished, less opportunity is afforded for the elimination of heat from the skin, while reflex action stimulates and increases the development and production of heat within the body.

It may be repeated that in healthy individuals taking an ordinary cold bath or hydriatic application, the heat loss is not demonstrable by the thermometer: if the bath is moderately long, and not very cold, the bodily temperature will remain constant, the balance between the heat loss and heat production being maintained by natural activities.

Cold is essentially a depressant in its primary effect, but the forces of the body at once respond to prevent baleful influences and to resist its effects, both by the prevention of heat elimination and by increased heat production. There is a popular notion prevalent among the profession and laity that it is dangerous to apply cold to healthy persons while perspiring freely, for fear of reducing temperature,

It is the experience of hydriatists that no harm, but good, results from such applications, provided the person is not at the time overfatigued. The writer has frequently observed young men for this reason refusing to enter the water or swim until they have "cooled off." The application of cold water to the external surface may be used to lower internal as well as surface temperature. This loss is facilitated by the administration of friction, a fact utilized by Brand in his bath for the treatment of typhoid fever. Friction causes a dilatation of the surface blood-vessels through its action upon the vasomotor system. The dilated blood-vessels bring to the surface a larger volume of blood, favoring greater heat loss. Heat elimination is much more pronounced in febrile conditions than under normal and physiological ones. Winternitz has shown that heat elimination can be increased by friction 30 per cent., and that its application during the cold bath will prevent collapse. In febrile conditions the superheated blood, brought to the surface by the friction, and in contact with the cold water, gives up its heat and re-enters the circulation considerably cooler. This has a direct effect upon the heat centers, especially the thermogenetic one, lessening the formation and favoring elimination. The intimate relation between the heat centers and the vasomotors enables the refreshed centers, struggling under febrile toxins, to better stimulate this center to dilate its peripheral blood-vessels and cause further heat loss. Here and elsewhere it must, however, be noted and never forgotten, that the use of cool or cold water in febrile states is not, as so firmly believed, to simply *reduce temperature*. While this does take place, still the important element is the rousing of the nervous system to battle against the invading host. This will be more clearly shown when we consider typhoid fever. Localized applications reduce the temperature of the part to which the cold is applied, but have no appreciable systemic effect. In some instances, continuous applications of cold to the head reduce general temperature by acting upon the heat centers of the brain, just as an ice bag, when applied over the heart, may produce the same effect, by cooling the blood and slowing the heart's action.

Physiological Action Upon the Circulation.

The circulatory system, comprising the heart and blood-vessels, may, from a general point of view, be divided into four divisions: (1) The *heart*, acting as the propelling organ, or the *vis a tergo*, to the movement of the blood, distributing it to the different areas of the body, principally under the influence of the vasomotor system of nerves. These, in their turn, are influenced by all conditions within and without the economy—heat, cold, functional activity, emotions, nervous actions of various sorts, etc. (2) The *arterial system*, with three great areas that are of extreme interest to the hydriatist—

the arteries of the skin, the arteries of the muscles, and those of the internal viscera, especially those supplied by the splanchnic nerves and commonly influencing portal circulation. (3) *Capillaries*, those minute intermediate blood-vessels between the arteries and veins. (4) The *veins*.

All of these are influenced directly and indirectly by the application of varying temperatures to the external surface, especially the skin and muscular system. The quantity of blood in the human body is, within reasonable limits, fixed, and, *ex necessitate rei*, the production of an influx of blood into any one of the great physiological areas of the body (skin, muscles, viscera) acts as a depletent upon the others, and is a ready explanation of why a person may feel faint when suddenly entering into a hot room, or while taking treatment in a hot air or vapor bath.

The Action of Heat Upon the Circulation.

Placed in a warm or hot bath, or, for better illustration, in a hot air chamber or other heating method, the primary or immediate effect will be the sensation of heat. This is conveyed centrally by the sensory nerves, and produces a *temporary* or transient slowing of the pulse and heart's action, with an increased force of the former. Coincident with this, there may be noticed slight oppression of breathing, tightness and throbbing in the head, or faintness. The skin and, later, by conduction, the subcutaneous structures, begin to absorb heat from the surrounding warm medium, accompanied by the distinct sensation of increased surface warmth to the examining hand. After a variable time, by conduction, absorption and action upon the cutaneous thermic nerves, the superficial blood-vessels dilate and the skin assumes a more pinkish hue, due to the increased amount of blood on the surface. The heart's action is noticeably increased, the pulse more rapid and smaller, and arterial tension lowered. The larger amount of blood upon the surface absorbs the heat that has entered the tissues, and, re-entering the general circulation, is carried to the medullary centers governing heat formation and dissipation, and which are in intimate association with the vasomotor, cardiac and respiratory centers. This heated blood quickens the response of the centers and causes the necessary changes to take place on the surface that will insure heat loss, the natural forces responding to the thermic stimuli in their endeavor to throw off or offset the effects, by heat loss from the dilated vascular surface, and by perspiration. The latter aids by the heat it removes and by evaporation—a distinctly cooling process. As we have seen, the temperature of the tissues is raised. If, instead of heated air, we employ water, the results are the same, save that, where mechanical stimulation, as in the douches, is superadded, the action is more rapid and pronounced. As soon as the surface dilatation takes

place, and the stream of blood is directed outward, the blood-vessels of the internal organs, because of the lessened amount of blood, and by reflex action, contract, thus bringing about a physiological anemia. Where heat is long continued, an atonic vascular state is induced, accompanied by more or less relaxation and enervation.

Extreme heat or hot water applied to limited areas produces temporarily the same effects as extreme cold—local tissue and superficial blood vascular contraction, general rigor and the sensation of pain. A practical point in relation to the contraction of the internal blood-vessels of the brain is the use of cold to the head. This will maintain vascular tone and prevent cerebral symptoms, faintness, oppression, etc.

The Action of Cold Upon the Circulation.

The influence of cold upon the cutaneous surface is more decisive than that of heat, and, as has before been stated, is tonic in its action. This rapidity of action on the part of cold is one of its most interesting effects. Immediately following a general cold application, we find a refrigeration takes place, accompanied by pallor and contraction. These changes are easily detected by touch and inspection. The skin becomes pale, somewhat shrunken, and the superficial blood-vessels contracted. The thermic nerves conveying the cutaneous impression of cold to the central nervous and sympathetic systems, transiently increase heart action and pulse rate, but where the application is brief—that is, tonic—it is almost immediately succeeded by a lessened frequency and stronger heart beat. The pulse is slowed and its volume notably increased, a fact easily demonstrable to the finger. Concomitantly the blood pressure rises, sometimes from 20 to 40 m.m., as revealed by the Riva-Rocci sphygmanometer (broad band). My personal tests have shown that the peripheral tonic increase of circulation is due to the better blood pressure, and not to a weakened vascular state. Winternitz, Strasser, Baruch and Kellogg[1] have made like observations, especially the latter. These results, physiologists tell us, arise from reflex action, which temporarily excites the accelerator nerves of the heart, later slowing its action through the pneumogastric. With the cessation of the application and reaction, the blood-vessels become slightly dilated, and more blood actually circulates through the skin. This dilatation of the blood-vessels is tonic; that is to say, there is a moderate contraction of the vessel walls, the result of the action of the inhibitory fibers and centers upon the vasomotors. The vasomotor mechanism of the body is most intimately concerned with the production of all these vascular changes, both in its periphery and centers located in spine and me-

1 Kellogg, J. H., "Rational Hydrotherapy," 1900. Baruch, Simon, "Hydrotherapy," 1898; Winternitz, Wm., "Die Hydrotherapie auf physiologischer und klinischer Grundlage," 1880.

dulla oblongata. These nerves run in the mixed spinal nerves, and are closely associated with the different sensations that arise normally at the periphery and usually recognized by afferent nerves. Again, we note that where the circulation is actively drained into a part there is a lessening of the quantity of blood in some other vascular region. This fact is utilized in practice, especially with reference to the action upon the abdominal blood-vessels supplied by the splanchnic nerves, the dilatation of these blood-vessels producing vascular anemia in distant parts, or *vice versa*. These results are more quickly induced, lower temperatures better borne, and the effect longer continued and more extended, where accompanied by mechanical stimulation, as in the various forms of douches.

That the physiological action of external temperatures, applied to the skin and acting upon distant blood-vessels, is more particularly brought about through *reflex action* than by any other means, has been clearly demonstrated by Naunann in the following experiment:

The head of a frog was separated from the body, being only connected by the medulla oblongata. He next severed one leg, after preventing the loss of blood by tying the vessels so as to leave it connected with the body by the sciatic nerve. He now applied thermal, chemical and electrical stimuli to the foot of the partially severed leg, while he observed under the microscope the mesentery. Shortly after gentle irritation of the peripheral endings of the sciatic nerve in the foot, the circulation in the vascular network of the lungs and mesentery was accelerated, and resumed the former condition slowly after the withdrawal of the irritant. Strong irritation of the skin weakened its circulation; the feeble irritant strengthened it. As there was no possible vascular or nerve channel from the part irritated to the part thus visibly affected, the conclusion is inevitable that the effect was purely reflex.

Maximilian Schüler[1] trephined rabbits, carefully exposing to view the vessels of the pia mater without disturbing the dura, which, by its transparency, facilitated his observation. He carefully noted the normal circulation of these vessels, and ascertained that even simple pressure upon the belly produced dilatation of the veins, and sometimes also of the arteries, probably through mechanical interruption of the venous return flow. The most interesting observation, however, was that when he placed cold wet compresses upon the belly of the rabbit, the vessels of the pia mater invariably dilated, cerebral pulsation became more pronounced and slower, the respiration was deepened and slowed. When warm compresses were applied the arteries and veins of the pia mater contracted, the pulsation became less pronounced and more frequent, and respiration more shallow and rapid.

[1] J. Schueler, Mag. Deutsches Archiv. f. klinische Medicin, No. 6, 1874, XIV. Quoted by Esmarch.

Indeed, it may be regarded as proved that *a causal connection certainly exists between the various external applications of water and the typical changes in the vessels of the pia.*

Schüller believes that "in the beginning of the application the pial vessels are affected by reflex irritation from the cutaneous nerves, and that the real effect upon the pial vessels occurs only when the thermic influence upon the cutaneous vessels has gained the ascendency. Local applications of cold to a limited area produce shrinking and shrivelling at the point of contact. Pallor accompanies this condition, due to a contraction of the blood-vessels and finer capillaries, especially their circular fibers, by means of which the blood is driven out. Long continued, a paralysis and dilatation of the blood-vessels occurs. It is axiomatic that prolonged cold depresses circulation and vitality, short applications act as a tonic. It is interesting to note, at this point, that the general vascular tone brought about by the application of cold to the surface more nearly resembles the healthy condition of blood vascular circulation than that induced by any other remedial measure. The heart may be slowed, its contractions made firmer, the pulse fuller, dyspnœa, discomfort and precordial distress relieved by the cold compress, coil or ice-bag applied over the heart—that is, to the precordium. Winternitz has summed up its effects and action by the apt name he gave it, "the hydrotherapeutic digitalis." The alternate application of heat and cold to the cutaneous surface acts as battledore and shuttlecock with the circulation; *heat* dilating the superficial blood-vessels, increasing the heart's action, accelerating the pulse, lessening resistance and lowering arterial tension; *cold* contracting (tonically) the superficial blood-vessels, decreasing heart action, slowing the pulse and raising arterial tension. These circulatory changes, following one another, influence the activity of distant organs. Temperature, nerve and vascular effects are closely allied, and, as in heat production, so in blood vascular circulation, cold enhances the tone of the blood-vessel wall, while heat lowers it, although both may be followed by vascular dilatation, in the one instance tonic (cold), in the other, atonic (heat). It is because of the reflex action just above noted that clinicians utilize dermal thermic applications for the production of special changes in the circulation, and by these means endow the different organs with increased and active function. The blood is the life of the individual and of the part; it is the great road upon which is conveyed nutriment to each and every tissue; the highway upon which all waste products are removed from the various organs; through the blood repair and growth take place; it eliminates waste products and maintains health. It is thus evident upon reflection that he who controls in a measurable degree the circulation of the human body controls measurably all of its functions, all of its activity, and has within his grasp a means alike of preventing

disease and of restoring health. The circulation is one of those flexible agents by means of which, in diseased conditions, medicaments are carried to their destination and function stimulated. Thus any agent that enhances or controls circulatory activity and distribution, influences and controls the absorption, distribution, action and activity of any remedial medicinal agent used. One of the most satisfactory and valuable of all the effects of thermic applications to the periphery, is the fact that through its influence upon the vasomotor system the circulation and activity of far distant organs are materially changed. Thus, a congested or inflammatory condition of an internal viscus may be relieved not only by the suction-like process of drawing blood to the surface, or by the increased pressure of the blood behind forcing it out of the congested organ, but also by the increase of its circulatory activity, carrying to it restorative pabulum, by means of which it may regain its normal structure or may manufacture again its normal secretion.

Physiological Action Upon Respiration.

The main object of the respiratory process is to supply the system with the oxygen necessary for oxidative purposes within the economy. Respiratory function is carried on through the action of the lungs and skin. The mechanism consists of the alternate dilatation (inspiration) and contraction (expiration) of the chest wall, the movement being dependent upon muscular structures attached to the chest walls, together with certain additional muscular structures that may be brought into play under unusual circumstances. The average number of respirations ranges from 16 to 18 per minute, and bears the ratio to the pulse of one to four. The inspired air converts the dark venous blood, carrying reduced hemoglobin (Hb) to bright arterial blood (HbO_2), the former giving up its carbon dioxide and substituting in its place oxygen, held in loose combination. The skin likewise loses CO_2 and gains O by diffusion of gases. The function of respiration is presided over by a nervous mechanism, and thermic impressions influence respiration by stimuli reaching it through reflex nervous impulses. Peripheral impressions may deepen or weaken respiratory action. The intimate and close relationship, both structurally, by nerve connection and function, between the cardiac and respiratory systems, is such that any impressions acting upon one may result in influencing both.

Impulses are conveyed to the respiratory center in the medulla through the nerves of common sensation by way of the spinal cord, are there correlated and reflected to the agent directly concerned in the respiratory act, the lungs. The respiratory center may be influenced by thermic impressions applied to limited areas, as is seen by

the deep inspiration that takes place when cold water is applied to the face of a person who has fainted.

The Action of Heat Upon Respiration.

The immediate effect of a sudden general or local application of heat or hot water upon the respiratory function is a deep gasping, jerky and irregular inspiration, lasting for a few seconds, accompanied by a sense of constriction in the chest, slight oppression, and succeeded by a well-marked increase in the number of respirations, which are, however, much shallower in depth. This increase is very variable, so far as my personal observations are concerned. These effects, primary in character, are due solely to reflex action, resulting from the thermic stimuli upon the surface, but when the individual's responsive power comes into play they may rapidly diminish. Another factor is then added. As the temperature of the surface and surface tissues rises the blood absorbs heat, is conveyed to and bathes the medullary center, and by its irritation maintains an increased respiratory action, of, however, a more steady, regular and equable character. By the increased respiratory action, some heat and considerable vapor are lost. These stimuli, remaining within physiological bounds, augment the accelerator action of the center, but, where they become too powerful, may act as inhibitory factors by influencing the pneumogastric.

There is very little contraction, and, after a short period, considerable relaxation, of all the muscular structures concerned in respiration—a characteristic action of heat upon those tissues. Mechanical stimulation accompanying the application may more quickly produce these changes. The more rapid and shallower respiration is not conducive to better absorption of oxygen and the elimination of carbon dioxide, but is, on the contrary, an endeavor on nature's part to by rapidity make up the necessarily diminished intake, the result of its shallowness; hence we find the exchange and diffusion of gases lessened. Should the respiration become more adapted to the changed and heated surroundings, just in proportion will the gaseous exchange be increased. My personal observation has been that depth of inspiration is the essential factor. It may be said, in conclusion, that both factors reinforce one another, the one reflex, the other the bathing of the center in superheated blood.

The Action of Cold Upon Respiration.

As in the case of heat, so with cold or cold baths, general or local applications produce immediate spasmodic and interrupted respiration, frequently accompanied by a sense of strangulation. These last a variable length of time, from a few seconds to minutes if the bath

is continued, at which time the system adapts itself to the changed conditions, and a more steady, equable movement results.

The irregular breathing is due to the more or less spasmodic action of the ordinary and extraordinary muscles of respiration, especially the diaphragm. This muscle oftentimes contracts to such an extent as to "cut off the wind," an exceedingly disagreeable sensation. Contraction of the abdominal wall muscles and the adduction of the arms to the chest walls frequently occur at this time. These effects may be readily produced by local cold applied to the chest walls and abdomen. In moderate degree I have observed them from an ice-bag placed over the precordium. During this time the intake of oxygen and the output of CO_2 is lessened. These spasmodic effects result from the thermic irritation conveyed from the surface to the medulla, from there reflected upon the lung and chest muscles, as well as the *direct* effect of the cold application to the skin and muscular structures of the chest and abdomen, being thus accentuated by a general and local action reinforcing one another. When the vital responses adapt themselves to the external irritation, the vascular stream sets in from the periphery and better supplies the medulla with arterial blood, lessening its irritability. With the cessation of the bath and the induction of reaction, respiratory action becomes slower, deeper and easier. There is a sensation as though the lungs had had a load lifted from them were broader and more capacious. For a considerable time thereafter the respirations are, by actual chest measurement, deeper, the chest expanding from one-half to one inch. This I have personally observed upon myself and other individuals, both sick and well. With the deeper, broader respirations, diffusion of gases takes place, and we find the oxygen content and CO_2 elimination markedly increased. Friedrich found this to be true when the naked body was exposed to cold air alone, especially the increased oxygen consumption. All these effects are enhanced if made abruptly and accompanied by mechanical stimulation, as in the *douche*, and are roughly proportional to the lowness of temperature. The wide systemic results that follow the addition of oxygen to the blood stream, the metabolic changes that follow, the added facility of elimination from better oxidative processes, make this feature of hydriatics a most important and far-reaching one. The *alternate* application of heat and cold produces similar effects, but more pronounced. Reaction is more quickly favored.

These physiological changes are induced by warm or hot water at much lower temperatures than where hot or superheated air is employed. Radiant energy or light acts more quickly and at lower temperatures, owing to its tissue penetrability, or transilluminating property.

Physiological Action Upon Metabolism.

By metabolism we mean all those intricate processes, physical, chemical and physiological, by which the human or animal economy brings about its tissue changes, anabolic or reconstructive, catabolic or destructive.

The normal adult human maintains a metabolic equilibrium by the absorption and assimilation of food products and water from the digestive tract, and oxygen from the lungs; appropriating these properly prepared pabula by its tissues, and removing from the system the end-products of tissue change through the excretory organs, and carbon dioxide from the lungs.

When metabolism is equally balanced, the input is just sufficient and proper to meet all the demands of functional activity, repair all waste, furnish sufficient force and heat, the output of waste material being promptly and properly removed *in toto*.

The great channel by which the pabulum is conveyed to the tissue, and the detritus removed from it, is the blood; and, as we have heretofore noted, this organ, in its circulatory activity, is greatly influenced by hydriatic procedures. Metabolism of tissue may be influenced by five means, as follows:

1. Through the *circulation*; an activity of function resulting from an increased quantity of blood flowing through the organ or part.

2. Through the *blood*; better composition, and in which the presence of increased O stimulates oxidation and tissue change.

3. Through *blood-pressure*, an increased blood-pressure causing more blood to pass through the capillary walls, and thereby favoring nutritive changes.

4. Through *temperature* changes upon the tissues.

5. Through the *nervous system*, especially the vasomotors increasing the circulation in a part; stimulation of trophic nerves, that increases the capacity of the tissues to absorb nutriment.

To attempt to describe in detail the manifold and intricate nature of the changes that take place is foreign to this work, but the influence of hydriatic procedures upon metabolism will be considered under four headings:

1. Secretion.
2. Absorption.
3. Tissue change.
4. Excretion.

1. *Secretion.*—The importance of this function of metabolism can hardly be overrated. When we reflect that upon glandular structures the body depends for all those juices by means of which food is rendered soluble; for those more or less understood and appreciated internal juices or secretions; for lubrication and other functions; we

realize that, no matter where we turn, we find the glandular cell waiting to respond to stimuli. Nowhere in the broad range of physiology and pathology do we find such satisfactory returns for hydriatic intelligence as in this field, for chronic glandular disturbances are among the constant pictures before the clinician's eye. Study, reflection and observation have taught me the profound influence of hydrotherapy—heat and cold—upon these structures. In general terms it may be stated that brief applications of thermic stimuli, whether hot or cold, stimulate secretion, differing in degree rather than in kind; long-continued applications depress.

This difference asserts itself, however, principally because it acts on the muscular fibers of these structures: that cold is tonic, heat atonic. I have repeatedly demonstrated the secretory stimulation of heat and cold applied to the salivary and hepatic cells. Very hot and very cold brief treatments resemble one another closely; between are all gradations. The marked accompanying influence of hydriatics upon the circulation furnishes the medium from which the aroused cells may select the pabulum to reconstruct their own tissues, if they be defective, and from which to make a better and freer secretion. Thus physiology clearly and simply answers the question why a crippled glandular organ does better work in the economy, regains its normal tone and activity, under hydriatics. General applications of heat and cold influence the general secretory functions of the body, while local effects may be obtained by concentrating upon certain organs and regions. Both general and local effects are enhanced by abruptness, as well as mechanical stimulation, when it accompanies the application. Among the noticeable general results of hydriatics may be mentioned increased appetite, greater relish and capacity for food—an important element in chronic cases.

2. *Absorption.*—Without proper absorption, the pabula prepared by glandular organs would remain, and become useless to the body. Secretion and absorption are so intimate that what influences one certainly influences the other. As we have seen, the better juices and better prepared foodstuffs resulting from glandular action are in shape for quicker and surer absorption; and, as in the case of secretion, so with absorption, the more active blood-stream, the more active lymphatics and lacteals, take up the dissolved foodstuffs, and more rapidly and certainly distribute them to the tissues and organs. Nor does this stop with the alimentary canal. As we have seen, the respiratory activity being greater and the oxygen input larger, greater absorption of this living fire, oxidation, occurs, and the augmented quantities of it in the blood results in the better burning of waste materials, just as a stronger draft in a chimney better consumes the coal. But there are still other absorbent processes that are equally important, and which respond quickly to hydriatics, these being the inter-

and intra-cellular ones. Here the tissues absorb the new and better-prepared elements, giving up "old lamps for new," while the remaining surplus is better and more rapidly cared for by the lymphatics, because of the added muscular, glandular, nervous and circulatory influences. As in secretion, so in absorption, we secure the same thermic results: general applications producing general, local ones, local results. Abruptness and mechanical stimulation enhance. "By introducing belladonna into the rectum, and observing the length of time that elapsed before dilatation of the pupil, and other characteristic physiological effects, Fleury showed that absorption from the alimentary canal is very greatly accelerated by the cold douche. His experiment, and those of others, show clearly that cold applications to the surface stimulate absorption by the gastric and intestinal mucous membrane, and consequently that such applications must favor nutrition by promoting alimentation."[1]

The author has carefully studied clinically the influence of the hot, cold, and alternate hot and cold douche applied to spine and abdominal wall, and has observed greater absorption and activity from such measures, the scale showing a notable gain in weight, lasting often for months, and even years, after a course of hydriatics.

3. *Tissue Change.*—Through the whole body functionation takes place, a breaking down into detritus, a building up or reconstruction of tissue. This broad law is applicable to every organ, tissue and function, and is, in its entirety, one of the most complicated of the many intricate activities of the marvelous human body. That this is best accomplished with an actively distributed circulation, under normal pressure, high oxygen content and proper nerve force, no one will, I believe, deny. That normality of tissue action, ana- and katabolic, is promoted in health, and changed under pathological conditions, is so patent to any one who uses this agent that it is but a trite observation to make.

Winternitz has called attention to the fact that "when healthy persons who have for weeks displayed almost stationary weight, are subjected to heat abstraction once or several times daily, it will be observed that, if the other hygienic and *dietetic conditions* remain unaltered, especially the *quale and quantum of the diet*, a number of these persons will undergo a slight addition to their original weight, whilst the greater number will suffer a reduction of weight thereby."

For the past fifteen years all cases coming under my personal observation have been carefully studied with regard to the loss or gain of weight, under most varying conditions. I believe it to be true that both normal and pathological persons, as a rule, will remain stationary in weight, or reduce their weight, when their hygienic life and diet remain exactly the same. This we observe in treating the obese,

[1] Kellogg, J. H.: "Rational Hydrotherapy," 1901, p. 121.

On the other hand, we have observed that, oxidation, secretion and absorption being active, more food is taken, digested and absorbed. My experience with several thousand (three to four) cases has shown me that we can, by increasing the quantity or changing the quality of the food, regulate to a certain degree the gain of weight; and, furthermore, this gain will be of an entirely different character of tissue—stronger, more active and firmer to the touch. These changes are more prompt where the patient has been subjected to a heating method that stimulated diaphoresis, followed by brief tonic cold methods, mechanical stimulation enhancing the effects, the process in its response bearing a relation to the capacity of the patient to respond to thermic and mechanical irritation. That the nervous system is the largest factor in bringing about these changes cannot, I believe, be denied, for it is through this system that the internal visceral effects are produced by reflex action. As we shall see, the powerful effects upon muscular tissue aid the result, for bodily oxidative processes are intimately associated with muscular activity.

Roehrig and Zuntz found "that changes in the intensity of tissue metamorphosis appeared to be traceable to certain cutaneous nerve fibrils which were excited by cold. These nerve fibrils could also be aroused by other stimuli, such as strong salt baths, with the same effect of increasing tissue change."

An interesting point in connection with these experiments was that these increased oxidation processes seemed to be located in the muscles, through their nerve supply, and that the muscles need not, for this purpose, be aroused sufficiently to produce visible contractions. This was made evident by experiments made upon animals, in which the innervation of the muscles was placed in abeyance by arrow poison. In such animals tissue change was not only not increased by cold, but was reduced one-half.

"They concluded that the source of tissue changes in the animal economy, when affected by cold, lies in the innervation of the muscles, and this is confirmed by the trite physiological fact that the larger part of all combustion processes occurring in the animal body may be traced to the muscles." (Baruch).

Raising the body temperature by heat or hot water increases to a certain extent tissue changes, but is followed by an atonic state, from which the body slowly returns to the normal. Cold, *per contra*, is a direct and immediately stimulating measure, tonic in action. Alternate applications enhance one another as well as produce more permanent results. Mechanical stimulation augments the results. It may unhesitatingly be stated that the nutrition of those in health, and especially those diseased, is increased by the external application of heat and cold to the cutaneous surface.

4. *Excretion.*—Without excretion death rapidly ensues; in fact,

the failure of certain of its various organs rapidly renders the individual helpless, notably that of the lungs and kidney. Waste materials result from bodily activity; they are the ashes from the tissue fire. The principal organs involved are the kidneys, lungs, bowel, and secondarily the skin. This latter becomes more actively eliminant when any other function or organ is crippled. That the bowels may for years fail to properly remove waste material, is a common everyday observation, and the organism seems to fairly well adapt itself to this state, although detrimental to health, comfort, and provocative of disease. Not so with the lung or kidney; their failure in great degree, even for short time, is likely to prove fatal.

With the unusually increased pulmonary activity and exchange of gases we would have, as we have shown, a greatly augmented excretion from the lungs. This consists principally of CO_2, although ammonia, extractives, etc., are present. In exchange for these waste noxious products, oxygen in large volume is absorbed into the blood, this with other factors permanently raising the hemoglobin. All bodily processes requiring oxygen are, therefore, bathed in this gas, and as a resultant the waste products of the body are made ready for exit. This increased oxidation (and muscular activity) may be used to consume a pathological excess of sugar in the blood, as in a diabetes. That urea excretion rises under hydriatics I have demonstrated by hundreds of estimations. Formanek observed that after cold baths were given daily, so that a more decided abstraction of heat took place, the elimination of nitrogen in the urine increased markedly, and the excretion of uric acid generally kept pace with the excretion of nitrogen. In addition, a large number of extractives usually calculated as nitrogen sank after the bath period to 1.5 per cent., showing that the largest portion of the nitrogen was used up for the formation of the normal end-products of tissue change, thus leaving but a small portion for these extractives.

The influence of cold procedures upon the urine may be readily studied by those who will take the trouble to estimate the specific gravity and urea of urine seven or eight hours after such a treatment. Strasser[5] found that the elimination of practically all waste products is increased after the cold bath. Not only is urea and the uroteuic groups eliminated more freely, but we frequently find a diminution of uric acid, showing more perfect changes with increased oxidation. In addition to this, he found that there was an increased excretion of nitrogen, "which must be ascribed directly to the increased activity of the organism, a more active change, due to a better utilization of the food. The promptness with which this effect occurred is evidence of this fact." Some recent studies by the author, in his private laboratory, upon the specific gravity, urea, phosphates and purin bodies,

5 Strasser: "Hydrotherapy," Cohen's Physiological Therapeutics, 1902.

have shown a marked rise during the earlier baths (douches), followed later by a sinking, in many instances below the normal. I am fully satisfied that prompt and active elimination takes place from lung, kidney and skin, while clinical study has shown me remarkable biliary activity following both hot and cold methods. Especially is this true of short cold percussory applications over the liver regions, it not infrequently being followed by the so-called "bilious stool." Alternate applications, abruptness and mechanical stimulation are more decisive in their action. Heat or water measures, when used *alone*, do not produce all these effects, but, on the contrary, lessen the excretion of CO_2 and the absorption of O from the lungs, although increasing the terminal products in the urine. Cold not only augments the CO_2 elimination and O absorption, but brings about the changes we have described. *Alternate* applications enhance the actions here described, as does abruptness and mechanical stimulation.

In conclusion, it may be said that *heat* applied to the surface of the body diminishes the excretion of CO_2, lessens the absorption of O, and increases the elimination of waste products in the urine, while *cold* increases the elimination of CO_2, increases the absorption of O, decreases the formation and increases the elimination of waste products and toxic material through the kidney. While we have considered metabolic changes separately, it must be remembered that each is but a part of the whole, a mosaic from which the removal of one stone will mar the beauty and perfection of the whole.

Physiological Action Upon the Nervous System.

The extensive area of the cutaneous surface of the human body is a "harp of a thousand strings," upon which the hydriatic master can play the gamut of impressions, so as to obtain almost any physiological or therapeutic response. To those who have carefully read the preceding section it will be plainly evident that in the consideration of the influence of thermic and mechanical procedures upon the skin and distant organs, in every instance the nervous system has been mentioned as an active factor. Distant and internal results are entirely brought about through its dominating influence upon every structure and function of the human body.

Cut off from its nerve supply, a tissue wastes; in full possession of it, the part performs its function with regularity and normality. It has been truly remarked, "the cells are the artisans in the organic workshop, but the nerves are overseers." One can do no more than in a cursory and superficial way touch upon the influence of the nervous system with regard to thermic stimuli. A full knowledge of the minute anatomy and physiology of the nervous system is a prerequisite to a thorough comprehension of hydrotherapeutic effects.

The cerebro-spinal nervous system consists of brain, medulla and basal ganglia, spinal cord and peripheral nerves. The peripheral nerves are spread in a vast network over the entire skin surface, are both efferent and afferent, carry common and special sensations to and from the skin to nerve centers located in the central nervous system. They are distributed to muscles, glands and other structures in *the skin*, to the large and small skeletal muscles, and intimately connected with one another. Each segment of the cord, the medulla, basal ganglia, and even the brain itself, are in close direct and reflex connection with each of these parts, and each with one another. From cord, medulla and brain pass the cranial and spinal nerves that govern and control all the tissues of the body. All of these segments and levels are in turn connected with the sympathetic nervous system in hundreds of ways. It is upon these peripheral sensory nerves that the hydriatist plays with his thermic and mechanical stimuli; from their terminations myriads of impressions pass centripetally (inward) to the cord impressing its centers in the gray matter; on and upward to the medulla and basal ganglia to, finally, terminate in the gray matter of the cortex. From these "levels," cord, base and cortex, each sends out its own "reflex" messages the result of the stimulation, so that all tissues, organs, structures and functions correlated to the level are made to feel the imprint of far distant sensory perturbations. Here, then, are the wires, here the messages, here the "overseers" that raise and lower, restrain or urge, stimulate and sedate; here is the method by which far distant processes are brought in touch and their action harmonized. Were the peripheral sensory nerves removed the hydriatic response would be an unknown thing. But the human being is a sentient animal that responds accurately, surely and promptly to the master hand, and thus those changes at which so many marvel come to pass, even as the day succeeds the night. As we have heretofore said, hydriatics produce perturbations of these sensory nerves, the impressions of which leave their imprint upon the central nervous system as well as upon the tissues controlled by it.

Ably seconding the cerebro-spinal, is the *sympathetic or ganglionic nervous system*, consisting of a series of ganglia located in different portions of the body. A long chain, the *intervertebral*, extends from the upper cervical to the coccygeal region, lying on either side and between the vertebræ. They are connected with one another and each other, and send filaments to the ganglia in the viscera. There are ganglia in the thorax, abdomen and pelvis, and subordinate ganglia in certain organs and tissues. The fibres from this system are distributed to and follow the ramifications of the blood-vessels everywhere, and are intimately associated with the control of vital activities. This "vegetative" system, especially the great ganglia in the interior of the trunk, receives impressions from the nerves distributed over the

body and from the subordinate ganglia, rearranging and controlling them.

It must be borne in mind how richly the corium is supplied with blood-vessels, therefore richly with sympathetic nerve fibers. These respond with great rapidity to thermic impressions.

This system, then, has to look after principally the metabolic processes of the body—secretion, absorption, tissue change, excretion—and the circulatory activity that accompanies their function. While closely associated with the cerebro-spinal, it is not controlled by it. It may, by its action upon circulation, in its turn change the quantity of blood in the brain, and affect thereby mental activity and even consciousness itself. Under its beneficent influence the lungs, heart, liver, stomach, intestines, kidney and reproductive organs functionate. It is thus easy to see that through these marvelous and wonderful systems of nerves, the clinician may, by properly applying thermic and mechanical stimuli, so vary the normal and pathological processes of the body as to enhance the former and correct the latter. He can dominate the circulation, change nutrition, increase or decrease function, and even change the current of thought. Here, then, lies a method open to all, that may, through its action upon the nervous system, be made to reach the foundations of life itself. Within the nerve tissue itself the "neurons," or nerve cells, carry on this work. They consist of a neuron body, from which project wedge-like processes, the dendrites; a neuraxon or nerve fiber, "end-brushes" or contacts and telodendrons or end-plates. These cellular structures are in relation with, are superimposed in groups above and around one another. A number of years ago Waldeyer noticed that the "end-brushes" moved, were attached and detached, and since his communication we have seemed to have a clearer idea of this complicated problem. It is now held, *with some dissent*, that the neuron is a distinct and separate entity, influenced, like all other cellular structures of the body, and being capable of projection and retraction. It is by means of these movements that we are able to form a rational explanation of varying nervous phenomena.

That the neurons are similar in action to protoplasmic bodies we can hardly doubt. We know full well the action of heat and cold upon the white blood cell and ameba, the former increasing, the latter decreasing movement, so we can believe that the movements of the dendrites would be likewise affected. Thus would be explained the exciting effects of heat by increased movements of the dendrites, the reverse in the case of cold.

The Action of Heat Upon the Nervous System.

When the body is surrounded by a medium higher in temperature the sensory nerves convey the thermic impressions from the periphery

to the centers in the cord, medulla and brain. Speaking in general terms, it may be said that the appreciation by the nervous system of heat is slow as compared to cold, the rapidity of heat response being, of course, proportional to the rise of the temperature above the body heat. Heat in its primary action upon the nervous system is that of a stimulant, or even excitant, according to its degree and duration. After a variable state the superheated vascular stream coming from the surface where the blood has absorbed heat bathes all nerve tissue, so that the organism and its force rise to meet and throw off or nullify the influences that are acting upon the surface. Heat loss is now encouraged by the increased surface vascularity and perspiration. Even under proper adjustment and heat loss to balance the rise in temperature, we find that there remain in the tissues, and especially the nervous system itself, waste materials and toxins that have a depressing effect—in fact, are fatigue poisons. Relaxation in general, and a debilitating feeling in particular, the result of heat's own action on nerve tissue, results, the individual feeling a sense of lassitude proportional to his sensitiveness to heat and the duration of the exposure. That some of these effects are due to the action of heat upon cerebral tissue is shown by the fact that cold to the head will, in nearly all cases, prevent these unpleasant cerebral symptoms and enable the body to be longer exposed to higher temperatures. The peripheral nerves themselves become sensitive or acute, responding better to stimuli than under ordinary circumstances. The spinal cord, medulla and basal ganglia are more reflexly active. Owing to the attempt to prevent heat formation, the oxidative processes of the body are lessened, waste materials accumulate and by their presence oppress, excite, and add to the lack of vitality. All these effects are more rapidly produced where hot air is inhaled; from hot air quicker than water, and still faster from radiant energy that penetrates tissue.

The *neutral* line—temperatures between 92° and 96° F.—produces an action due to its very negativeness. It possesses no thermic properties, therefore the essential feature of peripheral nerve perturbation is absent. The peripheral nerve terminations, bathed in a fluid that renders them softer, and hence less conductive, free from thermic stimuli from the water, the usual atmospheric and other cutaneous irritations shut off, become, from the very absence of external activity, calm and quiet. Unable to eliminate by perspiration, the skin becomes moister, more succulent and less sensitive, from its own contained water. Restlessness, irritability, nervousness and excitement are so diminished as to almost insure prompt sedation. In Strümpell's celebrated case, where the only avenues of communication were one eye and one ear, the shutting of one and the closure of the other shortly induced sleep, owing to lack of excitation. It is in a similar

manner that neutral temperatures exercise their characteristic action of sedation, the result of an absence of peripheral stimulation.

The Action of Cold Upon the Nervous System.

Cold, per contra, in its action is quick and decisive. Almost coincident with its striking the skin its disagreeable (to most people) impression is carried centripetally, rousing the centers of the cord, medulla and brain. How noticeable is the effect of a dash of cold water upon the face of a fainting person, the rousing effect of cold water in the lethargy of alcoholism! It is often ten, twenty, a hundred times more rapid than heat. Brief cold applications are essentially tonic in action, probably more nearly an actual tonic to nerve and general tissue than any other medicament or method. The first effect, as I have said, is disagreeable, uncomfortable, accompanied probably by rigor and gasping. If the duration is brief, reaction, a true nervous phenomenon, takes place, followed by all the pleasant sensations to be hereafter described. The cutaneous perturbations set up by cold reach the cord, medulla, basal ganglia and brain, the ganglia and nerves of the sympathetic system, and start in action the thousand and one effects we have heretofore described, and which influence temperature, circulation, respiration, metabolism, muscular tissue, etc. That these results are due to nerve action alone, we again quote that experiment where Naumann separated all the parts of the posterior extremity of a frog, so that the limb remained attached to the body by the sciatic nerve. He then applied cold to the leg, and observed that if the cold were moderate there was a diminution in the capillary circulation of the mesentery, but when the application of the cold was prolonged there was a dilatation of the vessels.

Upon mentality, a brief application of cold to the head or face results in increased cerebral activity, as does a general tonic bath, more noticeable where we employ percussive measures, as in the douche. Prolonged local cold to the head, as well as to the body, results in a lessening of mental activity, a drowsiness, an incapability for cerebration, often noted by those who are lost in snow storms or long exposed. The author has personally experienced this numbing effect. There can be no denial of the fact that the frequent use of general tonic cold baths results in a more active mentality. Mental action may be stimulated and more work accomplished by certain local baths. The author has repeatedly demonstrated on his own person, clinically, the increased cerebral activity that follows the cool or cold sitz bath.

The functions of the spinal cord are much increased by cold applications, especially those that govern nutritive processes. Upon the peripheral nerves heat renders them more acute, as we have noted; cold, on the contrary, blunting sensation. This is true of the tactile,

pain and other sensations present in the skin, and to a certain extent it affects the nerve terminations in the muscles, for we have all remarked how clumsy is the cold hand. Pain may be abolished by very low temperatures, freezing by the rhigolene spray being formerly much employed in minor surgery. A gradual contact is more plainly felt than an abrupt one, just as a finer spray feels colder than a coarse one, the percussion of the heavier body of water dulling sensation. Reactions from these effects are, however, quicker under percussion effects.

Local applications of heat and cold can be borne at temperatures much higher and lower than where they are general. Certain responses, at different parts of the body, may be elicited through reflex action because of a correlation between the surface skin and deeper seated tissues and organs. Alternate applications of heat and cold, or heat followed by cold, may be summarized as an accentuation of both their physiological effects upon the nervous system, and should always have cold at the last because of its powerful tonic effects. Both are augmented where mechanical stimulation accompanies the thermic irritation. Clinical observation and study in health and in diseased states accompanied by a lowering of vitality, lessening of nerve energy, a retention of waste products, failure of elimination and fag, show that the alternate application of heat and cold, together with suitable diet and rest, form one of the most satisfactory means of dealing with these conditions.

Physiological Action Upon the Muscular System.

The muscles form one of the most extensive systems of the body, and a large part of the body weight, especially the striated skeletal ones attached to the bony framework for the purposes of movement and to subserve the needs of bodily activity. Intermediate is the heart, uterus, etc., and then the important group of non-striated fibers that are found in glands, blood-vessels and other important organs and tissues of the body. All muscular movement is dependent upon its nerve supply for activity, so that there is a close and intimate relation between nervous and muscular activity. The interruption of nerve connection means muscular inactivity and subsequent atrophy. Muscles are richly supplied with blood-vessels, which become dilated during movement and draw into them large quantities of blood. Thus, in a moving muscle there is more blood, more oxygen is consumed, more carbon dioxide given off, the process causing destruction of muscular protoplasm, increased urea formation and the production of heat.

It is believed that the source of most muscular energy is derived from the carbohydrates. This is stored up in the muscles during rest under the form of glycogen, and consumed by muscular work.



Plate 12—Normal Fatigue Curve of Man Aged Twenty-four Years (Kellogg).

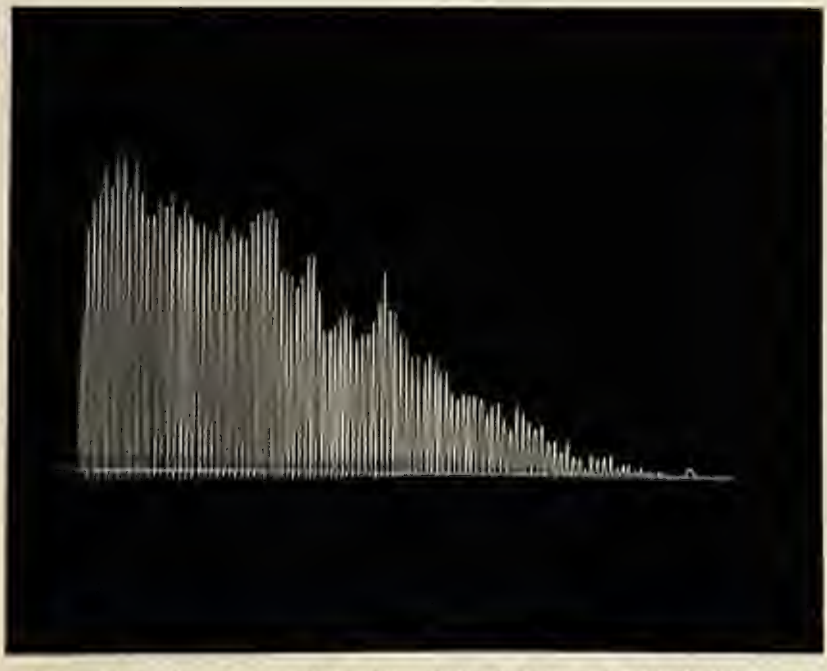


Plate 13—Fatigue Curve of the Same Subject After a Hot Bath (Kellogg).

While it is true that this class of foods furnishes the major part of energy, still some is undoubtedly derived from proteid material. Muscular tissue possesses the property of contraction, and this can be produced by numerous stimuli applied directly to it or acting upon its nerve supply. Muscular activity or contraction is essential to well-being and health. Sedentary states are provocative of certain diseases.

When muscular structures have been used for some length of time they become fatigued; that is to say, there collects in the muscle tissue waste products which prevent its proper energizing. The question of fatigue is largely determined by the metabolism that takes place in the muscles. It may be relieved by an influx of fresh arterial blood —a fact that the Sandwich Islanders take advantage of by applying massage to one of their number should he give out while in swimming.

This explains how fatigue is overcome by hydrotherapy, whether it be the result of neuro-muscular activity within physiological limits, or pathological fatigue as in neurasthenia.

We are able to state positively, through the curves shown by Mosso's ergograph, that hydriatic applications influence muscular structures.

The Action of Heat Upon the Muscular System.

Heat or hot water applications may affect skeletal muscular tissue in two ways: First, by reflex influences due to the surface thermic irritation; and secondly, by actual heat conduction through the skin and cellular tissues to the muscles themselves. Non-striated and other muscular tissues depend upon the first alone. Muscles gradually respond to warm or hot applications, relaxing. The blood circulation is greater, metabolism increased, and excitability and capacity for work diminished. This is readily appreciated by those who have experienced the enervating effects of prolonged summer heat, which so reduces physical and mental activity. Where hot applications alone are used, the individual remains for some time relaxed and enervated, gradually returning to the normal. With very hot baths there is a difference; they are distinctly stimulating. The cleanly Japanese have for a long time used these baths, of short duration, at temperatures which the Occidental skin would hardly deem possible of standing, finding in them a means of stimulation and revivification, overcoming fatigue and its incident depression. They resemble very cold baths in this respect. Thus the Jap and John Bull use different methods, but arrive at the same results.

Very hot baths may be, therefore, used in cases where the vitality is low—in fact, are to be preferred, as the neural response to cold is poor. These baths relax, sedate, remove waste fatigue poisons, as well as stimulate. Very hot local applications produce a *temporary*

pallor, rigor, contraction of blood-vessels, goose skin, some pain, followed almost immediately by redness, relaxation, dilated blood-vessels and comfort. Muscular twitching, spasm, pain due to contraction, to lessened blood supply or nerve irritability are relieved by their use. We have already noted heat's action upon the heart. The relaxing and depressing effects of prolonged heat can be relieved by a cold application. Mechanical stimulation accentuates these effects.

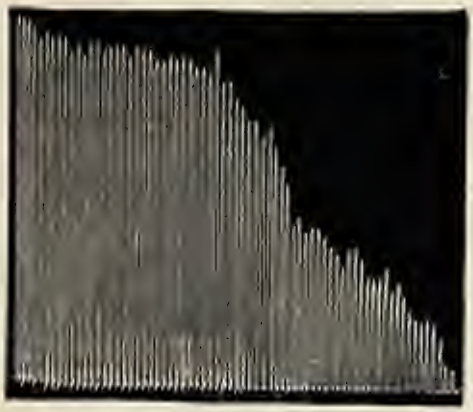
The Action of Cold Upon the Muscular System.

The first effect of *cold* upon the muscular structures of the body is a general rigor, associated with a contraction of the muscular fibers of the skin, causing cutis anserina, or the so-called "goose skin." The muscles of the chest and abdomen contract, producing gasping respirations. Pallor of the skin is present, due to contraction of the circular muscular fibers of the blood-vessels, driving out the blood. This irritability lasts for a short time; where the applications are long-continued, lessened muscular irritability and energy result, followed by lassitude and inactivity. Internal effects upon the muscular structures of organs and far distant tissues are entirely through nerve action. Cold may act in a reflex manner and cause muscular structures of the internal viscera to contract, as is frequently evidenced by the fact that a general cold, or even a local application, may produce evacuation of the bladder. It is a common clinical observation that cold to the general cutaneous or abdominal surface causes contraction and stimulation of the muscular structures of the intestine, increasing assimilation, overcoming atony and constipation by its action upon their muscular tissue.

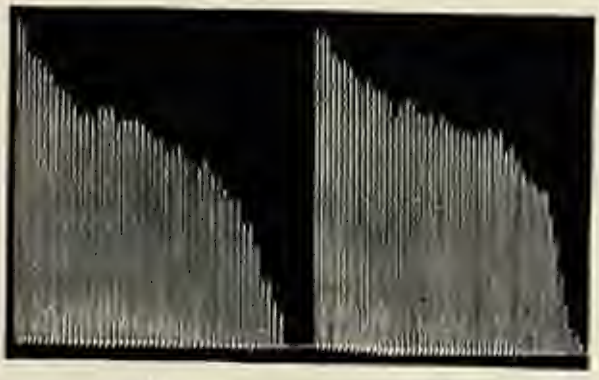
Mosso, by means of his ergograph, has shown, in a series of masterly studies, the action of cold upon muscles, as have Virag and Maggiora.*

The tracings here shown exhibit in graphic manner the increase of power under cold water. It is a true tonicity of tissue, with increase of power. Kellogg calls attention to the interesting fact that cold may lessen the irritability of voluntary muscles and increase the activity of the smooth fibers, thus giving rise to the appearance of goose skin. Muscular activity may be increased one-third, or even more, which is so well known at the present time that it is utilized by athletes the world over. No prize-fighter would think of entering the squared arena without his cold shower and rub down. Mechanical stimulation or percussion, added to the temperature effects, as in the jet douche, make it probably the most powerful tonic stimulant to these tissues now known. Clinical observations and personal experience but tend to confirm what these investigators have experimentally determined. Here, again, a heating procedure, followed by a brief

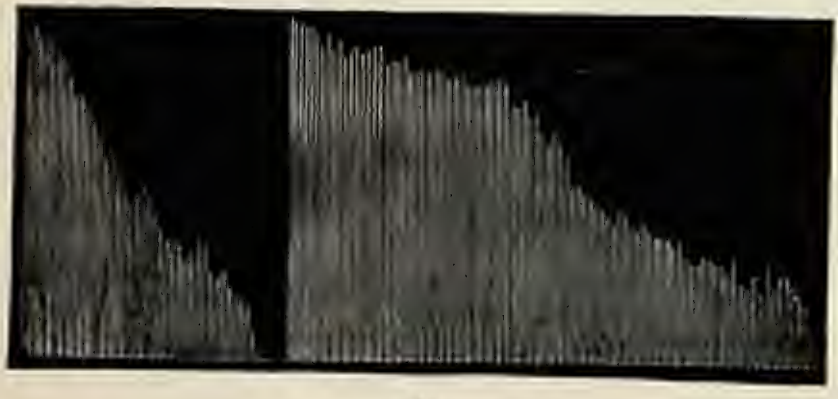
* Elektr. f. klinische Medizin, 1883, Vol. II, No. 1, and Vol. III, No. 7.



(3)



(1) (2)



(4)

PLATE 16—(1) Normal Fatigue Curve, Left Hand; (2) Normal Fatigue Curve, Right Hand; (3) Fatigue Curve, Right Hand, after Bath 50° F. for Fifteen Seconds; (4) Fatigue Curves after Gradually Cooled Bath (from Baruch).

cold bath—that is, an alternation of the two—shows that they reinforce one another's responses. Hydriatics is the method beyond question for the *over-strained* and tired worker of to-day, as well as for *the pathologically fatigued neurasthenic.*

Physiological Action Upon the Blood.

The blood is a complex fluid, the composition of which varies considerably in health, and markedly in disease. It contains all the elements essential for the growth, repair and functionation of tissues and organs, is the life of the body, and its failure to reach any atom means its death and decay. It receives its reconstructive pabula from the digested and soluble food of the stomach and intestines, its fluidity from the water ingested, and oxygen from the lungs. It carries all these, as we have seen, to the tissues, bathes them in it, and allows of specific selection of needed elements. It in turn becomes a cloaca from which refuse detritus is removed to the organs of elimination. It consists of the plasma, or fluid element, and corpuscles, both red and white. The red cells are engaged principally in supplying the tissues with oxygen, which is brought to them in a loosely combined state as oxy-hemoglobin (HbO_2), and which is exchanged for CO_2, reducing the hemoglobin to its venous state (Hb). The white cells are reparative agents, are the "soldiers of the common good," that as phagocytes fight invading bacterial hosts and toxins, or furnish opsonins, that render the bacteria less resistent to their action and raise the "index" of vitality. Winternitz[1] many years ago, and later, called attention to the fact that hydriatic procedures caused an increase in the white and red blood cells, especially the former, accompanied by an augmented hemoglobin content. The author[2] has in a recent article embodied a number of experiments made by him with a view to confirm the foregoing statements. It may be said that hydriatic applications increase the number and activity of the corpuscular elements as well as the amount of hemoglobin present. This, however, is not due alone to increased formation of cells, which does occur, but to vast numbers of these bodies which were lying dormant in the internal viscera, long bones, etc., and which were pushed into and taken up by the more active blood stream. That the quality and quantity of the blood are improved by hydriatics is a logical *sequitur* of what has gone before. Improvement of circulation, better secretion, and its inevitable improvement of digestion; more active absorption, hence quicker utilization of foodstuffs; more perfect assimilation and tissue exchange; rapid removal by the excretory organs, would mean more

1 Winternitz, Wm. "Changes in the Blood Resulting from Application of Heat and Cold." Transactions Modern Medicine and Bacteriological Review, December 1892.

2 Pope, Curtis: New York Medical Journal, 1901. "Treatment of Anemia and Chlorosis," and read before the Kentucky State Medical Society, 1907.

blood, better blood, cleaner blood; blood that has high oxygen-absorbing and distributing powers; a blood to reconstruct and heal tissue; blood whose phagocytes and opsonins are ready, *ex-a-pie*, for the invading hosts. It is the kind of blood the healthy, as well as the sick, need for the preservation as well as restoration of health.

The Action of Heat Upon the Blood.

Local heat of short duration vitalizes the white corpuscular elements of the blood and increases greatly their activity. These flock in large numbers to any point where a limited hot or very hot application has been made. This is very noticeable after the local use of the high temperatures employed in superheated dry hot air. The number of red cells locally is diminished, as well as their hemoglobin content and oxidizing power. With the large number of leucocytes, phagocytosis and opsonic index, as shown by Metchnikoff,* is raised. High temperatures of long duration weaken and destroy these cells. This is one of the dangers of fevers. General applications diminish the number of both red and white cells, due, as Winternitz says, to their retention in the viscera. For this reason the hemoglobin is also lessened. Strasser†† has found that general applications of heat decrease the alkalinity of the blood by the presence of an added amount of acid phosphate. He further observed a marked diminution in the density—that is, the fluidity—under heat. It therefore follows that we have a more acid and thickened blood stream, due, in my opinion, to a lessened quantity of liquid element.

The Action of Cold Upon the Blood.

General and local applications of *cold* increase the corpuscular elements, but the white are proportionately increased over the red. This is true in a physiological response, and equally so in fevers, Thayer‡‡ having demonstrated a large increase after the cold bath used in typhoid. With the increased white cells we may expect better phagocytes and opsonic activity, repair of tissue and healing. The greater number of reds, the larger hemoglobin-carrying power, mean redder and richer blood of greater oxidative powers, a stream capable of ridding itself of waste material and toxins. In the same studies, Strasser (*vide* above) demonstrated a marked increase of alkalinity of the blood, due to diminished acid phosphate, sometimes as much as 50 per cent., together with lessened density, although the actual number of cells was increased. This means a more fluid blood. As a natural corollary we may say that the blood is not alone freed from impurities, but those groups which we may as we please call "uric

* Metchnikoff, E.: "The New Hygiene," 1907, p. 22.
†† Strasser, Alois: Deutsches medizinische Zeitschrift, June 15, 1896.
‡‡ Thayer, Wm.: Johns Hopkins Bulletin, 1897, Vol. IX, p. 57.

acid" or purins, or the uro-toxic group, toxins and impurities of tissue, are destroyed and removed from the body, via the eliminative organs, without the intervention of chemicals. The alternate or the primary use of heat, followed by cold, secures all the advantages of both applications, the one supplementing the other, and both enhanced where mechanical stimulation is superadded. It should never be forgotten that hand in hand with these changes is a circulation evenly and properly distributed to all parts of the body under a stable and normally acting nervous system. When thus purified, it fulfils literally the proclamation of Holy Writ, "The blood is the life."

The Hydrotherapeutic Reaction.

Upon numerous occasions reaction has been spoken of, and it now remains to be considered in detail. The *hydrotherapeutic reaction* is a response of the vital activities of the body to thermic and mechanical stimuli of varying degree applied to the cutaneous surface. It is the antithesis of the actions produced by heat and cold. It is a complicated process, many-sided, but manifested principally along thermic, circulatory and neural lines. The varying stimuli applied to the cutaneous surface produce a primary or immediate result that is followed by secondary changes or reactions.

General reactive responses (cold) are coextensive with the structures of the body, every cell and tissue, every structure and function, feeling its influence. In order to have the reaction it is essential to have some thermic deviation above or below the neutral zone. Temperatures between 92° and 96° F., strictly neutral, are rarely, if ever, accompanied by mechanical stimulation, so that their action is purely a temperature one. A bath that is essentially neutral checks the stimulation of vital phenomena, and reaction is the result of a stimulating process. Neutral temperatures, it may again be remarked, are in their action quieting, nerve-obtunding and calmative to nervous action, and it is through nervous response that these manifestations are brought about. The reactions associated with heat are not, as a rule, sought, but are more or less depressive, relaxing and atonic in character. The action of heat has been previously considered, and the atonic responses are best understood by grouping them in a table, as has been done by Kellogg.[12]

Heat.

ACTION.	REACTION.
1. Brief contraction, then dilatation of the surface blood-vessels, especially of the small veins.	1. Vaso-constriction.
2. Slight pallor if previously red, followed by dusky redness.	2. Pallor.

12 Kellogg, J. H.: "Rational Hydrotherapy," 1901, p. 121.

3. Sometimes goose flesh appearance and slight shivering.	3. Skin smooth, soft and moist.
4. Slowed, then quickened high-tension pulse.	4. Pulse frequent, tension low.
5. Respiration, at first checked, then frequent; CO_2 diminished.	5. Respiration frequent, free, superficial.
6. Perspiration, at first checked, then increased.	6. Respiration increased.
7. Heating of the skin.	7. Gradual cooling of the skin.
8. Rise in internal temperature, from diminished heat elimination.	8. Depression of internal temperature from increased heat elimination and decreased heat production.
9. General nervous excitation; at moderate temperature, sense of comfort and relief.	9. Diminished nervous and mental irritability, drowsiness and depression.
10. Increased muscular irritability.	10. Muscular weakness and indisposition to muscular effort.

It will be observed that the reactive results show a general atonic state, lack of nerve tone and muscular activity.

Cold, however, is, *par excellence*, the agent by which we produce the well-known effects of reaction. In studying reaction we must remember the primary effects of cold upon the periphery: the gasping respiration, refrigeration, pallor, cutis anæmia, contracted blood-vessels, rapid pulse, dilatation of internal blood-vessels and nervous shock (physiological). With the cessation of the cold or withdrawal from the bath there ensues a feeling of warmth in the skin; it loses its pallor and assumes a reddish hue. Under the hand or when friction is applied it quickly "pinks" up, or becomes red. The goose flesh rapidly subsides, and the skin may feel warm to the touch, though rarely so. The blood-vessels that were contracted now dilate, not so much as under heat, but assume a median position between heat and cold—the "tonic" contraction, "probably due to an excitation of the inhibitory nerves, which overcome the action of the vasoconstrictors" (Baruch). This dilatation continues for some length of time after the bath, and is the standard for a normal skin circulation. Accompanying this is a sense of glow or warmth, exceedingly pleasant to feel: once experienced it is sought again. The internal blood-vessels are moderately contracted, owing to the greater quantity of blood in the superficial blood-vessels. The heart's action becomes slower and better, its sounds clearer, the pulse fuller and less rapid, and arterial tension is raised. The glandular activity of the skin is increased, the skin is moister and perspiration is present. For this reason the individual should be protected by a sheet until dressed. Respiration is broader, deeper and freer, more oxygen absorbed, greater CO_2 eliminated, while the chest walls and lungs feel as though there was greater freedom of action. The muscles possess greater tone, and there is the feeling of greater power for muscular effort. Possibly some

metabolic changes take place during this short period, enhancing the sense of well-being. There is often a sensation of tingling felt in the skin, due to the thermic and mechanical action upon the peripheral nerves. Pain is lessened, sensation acute. There is a bodily vigor and tone, probably due to spinal action. The mental faculties become more active, there is an increased capacity for work, fogginess is cleared away and mental clearness succeeds. This general feeling, best described as a *bien faisance*, or well-being, is one of the most delightful and pleasant of the neural effects of reaction. The aim being to secure reaction, care should be taken to study what will favor this result before, during and after the bath. For this reason fatigued persons should be carefully handled and rested *before* taking treatment. It may be taken as axiomatic that the stronger and more robust the physique the better the reaction; especially is this true when persons have been accustomed to the use of cold water as a daily procedure.

Warmth, both of body and the bath-room, is a necessity, and this may be secured by any number of measures. In strong persons muscular activity before the bath favors reaction; in weak ones, rubbing or friction, a hot enema, hot-water drinking, hot-air bath, or, what is by far the best, the incandescent electric light bath, stimulating vital activity and heat production, may be employed. *During* the bath we can hasten the subsequent reaction by using mechanical or percussive measures, such as douches, friction over the wet sheet, etc.

The manner of applying cold water to the surface influences very materially the question of reaction. A low temperature suddenly applied, with a higher surrounding temperature, accompanied by pressure or mechanical effects, produces prompt and active reaction. This can also be aided by voluntary movements, friction of the skin surface by the individual himself, and it may be stated that friction of any kind during the application of cold favors reactionary influences and prevents shock and collapse, a fact that will be carefully noted when we come to consider the application of the full bath in typhoid fever, the half-bath and dripping sheet. Baths that are cold or very cold, of very brief duration, with mechanical effects, hasten the result. Or the hot and cold measures may be alternated. *After* the bath reaction is favored by a warm room, hot enema, hot drink, friction with a crash towel or warm hand. Especial care should be paid to the legs and feet. A sheet should cover the patient as soon as reaction is secured to prevent evaporation of the moisture upon the skin surface that succeeds reaction.

There are individuals—but very few, indeed—who do not react well, and who require careful application of hydriatic procedures, but a thorough knowledge of physiological conditions and technique will enable the hydriatist to educate his patients to react promptly and to

the fullest degree. It is the author's invariable rule to require patients who are ambulatory to assist in rubbing themselves, not, as is generally supposed, to relieve the attendant, but to favor and stimulate reaction. Muscular movement, therefore, becomes one of the means of producing this condition.

An ideal reaction follows after the prolonged immersion of the body in cold water, even where an endeavor has been made to suppress reaction by avoiding great cold or percussive measures, as in the cool and cold full bath. This, of course, is the object sought in those applications that are antipyretic, or baths used in typhoid fever, such as that of Brand. It should never be forgotten that it is the physician's duty to study his patient so that, especially at the start, he will not apply a stimulant that will exceed the powers of response. I take it that it is the essential keynote of every form of systemic hydrotherapy that perfect reaction is the object aimed at, and that unless this is secured the benefit is lost. The author does not believe in the administration of narcotic poisons, such as alcohol, to prevent (?) shock. They are in themselves semi-antagonistic to reaction, and in febrile states add to the toxemia present. A failure to react is an exceedingly unpleasant condition, is usually accompanied by faintness, weakness, chilliness, cold extremities, pale cold skin, oppression, depression, lassitude, vertigo and headache. It is an evidence that the bath has been too much for the vital activities. Over-reaction or stimulation is attended by excitement, fullness of the head, headache and rapid heart action. Where reaction fails it is a sign to make the application shorter, colder, increase mechanical percussion and prepare the patient both before and after. Over-reaction requires cooling, non-mechanical measures at temperatures between 70° and 80° F. Kellogg[11] has tabulated these reactions as follows:

Cold. ℬ

ACTION.	REACTION.
1. Contraction of the small blood-vessels of the skin, with dilatation of internal vessels after a very brief contraction.	1. Dilatation of the small blood-vessels of the surface, with contraction of the internal vessels.
2. Pallor of the skin.	2. Redness of the skin.
3. Goose flesh appearance and roughness of the skin.	3. Skin soft, smooth and ripple.
4. Sensation of chilliness.	4. Sensation of warmth.
5. Trembling, shivering, chattering of the teeth in some cases decidedly painful and distressing sensations of "constriction," etc.	5. A sensation of comfort and well-being.
6. Force quickened, then slowing of the pulse, with increase of tension.	6. Slowing of the pulse, with increased tension.

11 Kellogg, J. H., "Rational Hydrotherapy," 1901, p. 131.

7. First checked, then quick, deep gasping respiration.	7. Respiration free, slower and deeper.
8. Cooling of the skin.	8. Heating of the skin.
9. In most cases slight rise of internal temperature.	9. Fall of internal temperature.
10. Perspiration checked.	10. Increase of perspiration.

Reaction is, then, dependent upon the vital capacity of the patient to respond, upon the general systemic condition, preparatory training, habit of using cold water, the temperature of the water, mechanical effects, duration of treatment, psycho-neural state, prior and post preparation.

Contraindications.

There are really few contraindications to the use of hydrotherapy. Certain conditions would lead to caution and care, but a physician in full possession of the physical and neural state of his patient should have no difficulty in adapting hydriatics to the case in hand. He will always remember that it is not the *disease* he is treating, but the patient that demands his therapeutic ministration. The extremes of life—old age and infancy—require judgment in the case of hydriatics. We can, however, by carefully, cautiously and *slowly* training the reactive powers, develop their power to respond to thermic stimuli of considerable strength, avoiding, therefore, *very* hot and *very* cold baths even after considerable training. Fatigue and exhaustion contraindicate cold baths, but this can be overcome by a preliminary hot or very hot application, succeeded by a *very* brief percussory cold one. Profuse perspiration not due to heat, accompanied by fatigue, indicates warm applications and frequent drying of the surface without friction; when stimulation has been brought about, very brief general measures may be used, or portions of the body rapidly sponged.

Rheumatic and gouty people do not, as a rule, stand cold well at the start, but must be gradually trained. Cold bathing is a good preventative of the "diathesis." A subnormal temperature and impending chill demand heating methods, and in these the incandescent electric light bath and superheated dry hot air are the best. Exotics, neurotics, neurasthenics, hysterics, undue mental excitability, etc., demand diplomacy. Cardiac disease was for years considered a contraindication, but Schott has shown this to be a fallacy, and to-day we use the Nauheim bath to compensate organic heart lesions. Hot and very hot baths are contraindicated in these diseases, aneurisms, or in any obstructive trouble with the circulation. The prolonged warm bath, with its devitalizing and atonic effects, should never be used save by medical prescription. Marked arterial disease and *extreme* debility contraindicate cold baths. In conclusion, we may say that good common sense and judgment, and the keeping within rational and temperate bounds, will prevent hydriatic mishaps.

CHAPTER IV.

THE INTERNAL USES OF WATER.

Most of the medical fraternity appreciate, in a desultory manner, the value of drinking-water, and that it has therapeutic uses; but few take occasion to acquaint themselves with the physiological action and administer it in a systematic, proper manner. From Hippocrates to to-day the drinking of water has possessed more or less mystical power, and the feeling that in "springs" or health spas there exists some subtle power has been shared by the medical profession. It has always suffered opprobrium through empirics, who, believing water a useful means to their ends, used the same to the discredit of the members of a learned profession. The physician, as a rule, has been very lax in his recommendations of waters supposed to possess certain marvelous curative powers because of the "naturally combined" salts they contain, the minute doses of which are supposed to effect the removal of poisons and the restoration to health. In truth, it was the water, plain H_2O, and not the mineral. Gallons upon gallons of printer's ink have likewise aided its supposed "mineral" value. We can really understand its universal bodily need when we recall what Claude Bernard has said: "Life exists only in a liquid medium, it is only by certain artifices of construction that the organism of man, as those of other animals, can live without it; but all the active cells upon which their functions depend live, without exceptions, like the infusoria, in a liquid medium."[1]

Water is one of the prime necessaries, its long-continued absence causing death. Man can live, as did Dr. Tanner, for forty days without food, but a very few days of absolute deprivation of water will cause death. When an animal loses 22 per cent. of its tissue water it dies, and a 10 per cent. loss will cause very grave disturbances. It ranks with air, heat and cold in its influence upon the processes of animal life. It may act as a food or nutrient agent, and as a solvent of all secretions; is a component part of every structure, excretion and secretion of the body; is the great diluent by means of which the dissolved food material is conveyed to and waste material from the tissues to the excretory organs. Every cell and fiber of the body is kept moist and bathed by this liquid, and unless it is present the function of the tissue is destroyed. The blood stream is made fluid by its use; in its presence more oxygen is absorbed and more carbon

1 "Etudes Physiologiques sur quelques Poissons Américains." Paris, 1868.

dioxide eliminated. It is the most grateful of all fluids for quenching thirst—a demand of the system to equalize the water which has been consumed in the processes of metabolism or eliminated from the body. It must be borne in mind that water does not act in a purely mechanical capacity, simply washing out toxins and waste material of tissue break-down, but is a true solvent, a powerful and vital stimulant; an oxidizer that promotes tissue change, and in its turn stimulates reconstruction—in fact, acting as a general rejuvenating agent upon the system.

Abstinence from water withdraws the water from the tissues, then increases the specific gravity of the plasma, reducing its solvent powers, and rendering nutrition and elimination impossible. The ingestion of large amounts of inorganic salts increases thirst by raising the specific gravity of the plasma, thus calling for more fluid to assist in their elimination. In the same way the eating of large quantities of proteid food, the end-products of which (urea, uric acid, creatin, etc.) thicken the plasma and demand dilution. Fats and carbohydrates, the terminals of which are water and carbon dioxide, do not demand the same amount of water as proteid, for CO_2 does not increase the specific gravity of the plasma and is eliminated by the lungs. Restriction of water increases toxemia, does not decompose fats, destroys appetite and the total food ingested, which may thus cause reduction in weight. It is in this connection interesting to note that sugar and peptone, carbon dioxide and urea, a product of proteid oxidation, have a high degree of solubility in water. Uric acid, oxalic acid and other abnormal products are poorly soluble, hence, as has been shown by Haig, they readily accumulate in the body, especially in those portions in which the circulation is least active.

An agent capable of so much good makes it of importance that the source of water supply should be free from all the contaminating influences that arise from the ordinary pollution common in civilized countries. Rain washes out a great deal of mineral and organic matter from the air, which is carried into our lakes and streams, to which must be added the sewage from large and small towns. A heavy responsibility rests upon civic authorities to secure a water free from the mechanical impurities of dirt, mud and bacteria, as well as from organic matter, and palatable to the taste, an ideal water, difficult to secure under ordinary circumstances.

Its physiological action is derived from the water itself, and not from any mineral contained therein. The effect of cold water taken internally is to refrigerate the part with which it comes in contact, the stomach, like the skin, having to overcome the impact of cold water upon its surface and bring about localized reaction. The mucous membrane of the stomach becomes pale, the blood-vessels and muscular structures contract. The cold water lying in the stomach causes a

lowering of temperature, a fact utilized in fevers. When introduced into the stomach or rectum Winternitz observed that the temperature of both of these structures was lowered, that the temperature of the large intestine fell during a period of twenty-five minutes until a reduction of 1.5° C. was reached. With the abstraction of heat the temperature of the water rises to the same as that of the surrounding viscera, at which time reaction sets in, the blood-vessels dilate and water is absorbed, slowly from the stomach, rapidly from the intestines. During this period glandular action is lessened. The muscular structures here as elsewhere are toned by the action of cold upon them, provided the quantity is not too great to stretch the viscus. The contents of the stomach and bowels are diluted by its local action. When reaction takes place the blood-stream is dilated and flushed by its presence. Reflexly, the heart's action is slowed, the pulse fuller and less frequent, with raised arterial tension, easily shown by the sphygmanometer and felt by the finger. If a fairly large quantity—half to one quart—be ingested, there may be a fall of from ten to twenty beats, lasting for ten or fifteen minutes, according to my observation. It has been pointed out by Winternitz[1] that the influence of the drinking of large quantities (quart) of cold water tends to produce a contraction of peripheral blood-vessels, and that its ingestion reacts upon the temperature of the entire body. The effect upon the pulse and circulation is due to the direct stimulation of the filaments of the pneumogastric and sympathetic nerves and the accompanying reflex action.

The excretion of water falls more directly upon the heart than would at first be supposed; therefore the greater the amount introduced the greater the cardiac labor, just as would be the case with a force-pump. Weak hearts and weak kidneys are strained by too great volume of water, weakening the former, irritating the latter. In fact, abstention from water diminishes the total labor performed by the circulatory apparatus, and thus spares the heart.

Their rapidity of action shows them to be of reflex origin. The rapid drinking of cold water increases temporarily respiration, but this quickly subsides. The free ingestion of water, like its application upon the external surface, favors the absorption of oxygen and the elimination of CO_2. Upon the blood and lymph it acts as a diluent where it is continuously drunk, although it may be so imbibed as to increase or diminish its fluidity.

As a diluent it favors the suspension of the corpuscles and the solution of the albumins and globulins, effete material and inorganic salts that increase the solvent power of the plasma.

Hooker has pointed out that immediately after the ingestion of considerable water, this increased amount is present in the blood, but

[1] Winternitz, Wm. "Ziemssen's Cyclopædia of Therapeutics," Vol. IX, Hydrotherapy.

shortly after this the blood becomes thicker and more condensed, showing that the water has entered the tissues. The absorption of water probably takes place through the veins of the stomach and intestines, and the rate at which it is absorbed in health depends somewhat upon its alkalinity and freedom from minerals, the presence of carbon dioxide gas being a stimulant to the vascular system to take up more rapidly the fluids contained in these viscera. It has been estimated that 10 per cent. of the water ingested is absorbed from the stomach and 90 per cent. from the intestines.

It is a well-known fact among clinicians that the reasonable ingestion of water favors digestive processes and assimilation. Not only does it favor absorption, but it becomes a medium by which the digestive pabulum is conveyed more rapidly to the tissues and nutritive exchange brought about. The writer has not only observed, but has had a number of people call his attention to the fact, that a patient eating the same amount of food with an increased supply of water internally is apt to gain in body weight, which has led to the popularization of the idea that water-drinking produces fat and tissue formation, a fact that is borne out upon investigation. Glandular structures are stimulated, as is the digestive process, the intestinal juices and peristalsis. A larger and freer flow of bile occurs from the common duct, less tenacious in character and capable of more pronounced influence in its digestive and antiseptic functions. The blood of the portal vein being diluted, this large glandular organ eliminates more toxins and waste products. Its action upon the muscular and secretory portions of the gastro-intestinal tract and liver is one of the explanations of why increased drinking of cold water overcomes habitual constipation. With the blood recharged with oxygen, more fluid in character, anabolic and katabolic processes are facilitated, and waste products of tissue change in the presence of this oxidizing agent disappear; there is a general revivifying and rejuvenating influence, a baptism that literally makes the tissue born again. The human body becomes stagnated, its processes inactive, its secretion lessened, its excretion diminished, its nervous system more sensitive, when the body is not supplied with sufficient water, and reasonable ingestion is apt to insure increased activities in these directions. It is a well-known fact that where the body has been robbed of fluids, as in loss of blood, severe diarrhea, etc., there is increased thirst and desire for more water. It acts as a diuretic, increasing the watery and solid constituents of the urine, lessening nitrogenous tissue waste. Oxalic acid, sulphates, the so-called uro-toxic group and extractives are consumed.

It has been found by Hawk[3] that copious water drinking increased the excretion of nitrogen and phosphorus by the urine, the former

3 University of Pennsylvania Medical Bulletin, 1905.

due to washing out of the tissues of urea previously formed but which has not been removed by normal processes. Katabolic proteid processes being likewise stimulated, there is increased urea formed. The greater phosphorus elimination resulted from the increased activity of the cellular structures of the body and the katabolism of nucleins, lecithins and other phosphorus-containing bodies. Maximum excretion occurred with absolute regularity on second day of water ingested, while fluid excretion was greatest on days of copious drinking. In like manner Heilner,[4] experimenting upon dogs, came to the conclusion that the increased nitrogen was largely due to a more active katabolism in the body of organic material.

Cold water should be only drunk in *small* quantities immediately before, during or for an hour after meals, for when taken cold into the stomach during the process of digestion it chills, diminishes the secretion of both hydrochloric acid and pepsin, as well as diluting the gastric juice. The ingestion of large quantities of water, especially at meals, is to increase the appetite. It may produce a lack of motility and subsequent digestive disturbances. It should be especially avoided by those who have a dilated stomach. Like everything else, water must be administered with the object in view, and upon rational consideration of its physiological effect. If it is taken in too large quantities, and its use prolonged, it is apt to interfere with tissue change and promote disintegration. It is best administered at 50° to 60° F., from one to two hours after to thirty minutes before meals, during which time the patient can drink from six to eight ounces every half to one hour. In this way the tissues become saturated, and physiological effects are obtained.

Hot Water.

The physiological action of hot water, taken internally, is similar to the action of this agent externally—that is to say, it tends to produce an atonic condition of the structures with which it is brought in contact. The digestive system is relaxed, its juices diluted, the muscular and secretory functions weakened. The empty viscus is cleansed, and mucus and particles of food adherent to the stomach walls removed. The thermic impressions are conveyed to centers in the cord and medulla, increased heat absorption takes place; the system, in its endeavor to equalize this, dilates the peripheral blood-vessels, perspiration is induced and heat lost. It increases the heart action ten to fifteen beats per minute. After the water is absorbed its general action is similar to that of cold water, which has been described above.

Hot water drinking is now a popular fad with the laity. There is no question but what, in some forms of gastritis, where there is a

4 Heilner, E.: Zeitschrift f. exper. Path. u. Therapie, Vol. 47, p. 138, 1906.

large accumulation of mucus in the stomach, the drinking of hot water, by removing this tenacious mass, favors the digestion of food. There are, however, many objections to its use even in these cases.

Its physiological action is similar to the foundation of all hydrotherapeutic applications of water, viz., that hot water acts as an atonic agent, relaxing, depressing, debilitating; while cold water is tonic and stimulating to all structures with which it comes in contact.

Therapeutics.

The purest water is that which has been freed by distillation from all organic and mechanical impurities. This water, being deprived of air, has a disagreeable or "flat" taste, that can be obviated by the introduction of new air into the water. A simple way of doing so is to half fill a gallon bottle with distilled water, cork tightly, and place in a refrigerator until chilled, after which the bottle is to be agitated, whereupon the water absorbs the air and becomes palatable to the taste. By far the most pleasant beverage, both for general, hygienic and therapeutic use, however, is a distilled water at 70° to 60° F. that has been carbonated—that is to say, charged with carbon dioxide. This water is pure and has a "snap" that makes it palatable. A secondary consideration is the fact that carbonated water is more readily and quickly absorbed from the mucous membrane of the stomach, and for this reason the author has never seen any harm result from the moderate drinking of soda-water, provided a pure fruit juice is used in connection with ice and carbonated water, although he is distinctly opposed to the use of this drink with ice cream.

There is a charm about effervescence that is fascinating to most people. Natural effervescent or "sparkling" waters have always held a popular place, but have of late been displaced by the easier made artificial product. The carbonated and bubbling water possesses a mild stimulating property, singularly attractive to the average palate. In reasonable quantities the aërated water is without prejudice to health. Its physiological action is obtained from the water itself, and not from the mineral contained therein. Certain waters possess therapeutic value because of their minerals, particularly the sulphates, but the good derived from *ordinary mineral spring water* can be obtained from the use of plain water, if drunk in sufficient quantities. There are many disadvantages in the ordinary mineral water, absorption being lessened and made more difficult the greater the amount of mineral matter it contains. It may be an Hibernianism to say that the best mineral water is the water that contains no mineral, but this, nevertheless, is a truism. Too often value is credited to mineral springs which in reality they do not deserve; for it is from the rest, change of diet, freedom from care and worry, and *the ingestion of large quantities of liquid containing a small or medium amount of*

mineral that results are obtained. It is likely that better results would have been obtained if they had used the water without any mineral, but simply carbonated. Frequently harm is done at springs by the endeavor to secure *full monetary returns* by drinking too freely of the water, and this also is the danger in its empiric use by the charlatan. The amount of water that the average healthy individual should drink ranges from six to eight glasses in twenty-four hours. In diseased states it is a question for the discrimination and discretion of the attending physician, who will prescribe it upon the full knowledge of its physiological action and the needs of his patient. In febrile states patients should be systematically given cold water, for it is an antithermic agent, stimulates all the excretory organs, especially the liver, destroys and eliminates toxins, leucomaines, ptomaines, etc. If free perspiration can be produced the temperature will be reduced.

Debove, practicing Brand's method in typhoid fever, gives six ounces of cold water every two or three hours as a means of stimulating the excretion of the typhoid toxins. The urine frequently rises under water drinking to twice the normal, even in febrile states. Winternitz has suggested two simple processes by means of which to regulate the quantity of water the system should take to increase the fluid in the tissues, or to cause effusions to be absorbed. If it is desired to flood the tissues, small quantities should be taken at frequent intervals; to stimulate absorption and remove serous exudates, administer a reasonable amount of fluid followed by a considerable period of abstinence, say once every twelve hours. He has secured excellent results in dropsy by so doing.

As before stated, the free drinking of cold water stimulates the entire digestive tract, and removes one of the banes of modern civilized life, constipation, when this is due to simple causes. Two glasses may be taken before breakfast at 40° to 50° F. All persons afflicted with rheumatism, gout, uric acid and its allied toxins, should drink freely of water in such manner as to flood the tissues, favoring oxidative processes. The dry, inactive, scaly or greasy skin is much benefited by having its tissues freely drenched with water. This is facilitated by external applications, followed by good reaction—in fact, all conditions pointing toward a free ingestion of water internally likewise point to its use externally.

In diseases of the liver water should be drunk liberally, ten to twelve glasses daily, not only with a view of eliminating those crystallized substances likely to produce gall-stones, but to liquefy the blood in the portal vein, and thus favor the solution and elimination of intestinal as well as systemic poisons. By its introduction into the intestinal canal many of these poisons are oxidized and never reach the portal circulation. It is a fact, well known even to the laity, that the habitual drunkard, the periodic spreer, the morphine fiend—in fact,

any one addicted to the use of a drug—can, to a certain extent, reduce the amount taken and diminish its evil influence by free water drinking. Diuresis may be induced by large quantities of cold water, raising, as it does, the blood-pressure in the kidney.

It should be borne in mind that cold water drinking is contraindicated when one is very much fatigued, whether the skin be active or inactive, for shock and collapse may be thus produced. Hot water has very little use in internal therapeutics. By its mechanical help in removing mucus, it is useful in chronic gastric catarrh, being drunk one hour before meals at a temperature as hot as can be borne—so hot, in fact, that it should be sipped with a spoon. The object in drinking this an hour before meals is to permit of the stomach's returning to a normal condition before food is taken. It debilitates the entire digestive system. Its use is particularly pernicious in those cases who have an atonic or dilated stomach. Nearly all secretory disturbances are aggravated by its use except hyperpepsia, in which the amount of gastric juice is lessened. In some instances patients have received temporary benefit from the use of very hot water in neuralgic states of the stomach and bowel, possibly due to the removal of fermenting material and the relief of spasmodic conditions present. It relieves colic in a similar manner. We may provoke emesis or vomiting by means of the copious use of water ranging from 94° to 96° F. The author does not at all believe in the provoking of emesis, but much prefers the use of the stomach-tube, as by that means he is certain of not only removing the stomach contents, but of knowing that the viscus is clean. Drinking water at meals must be avoided, save in small amounts.

CHAPTER V.

ASSOCIATED PROCEDURES.

The hydrotherapeutist, in the practice of his science and art, calls into play certain procedures that are of themselves not truly hydrotherapeutic, but which have been for years indelibly associated with his work. For this reason we find them described in books upon this subject; they form one of the essential means he has at command for obtaining results, and have by courtesy, so to speak, been relegated to this branch of medical practice. I have called them, because of their peculiar relation, "Associated Procedures," and will consider under this head, sunlight, incandescent electric light bath, arc light bath, hot air, superheated dry hot air, vapor of steam, etc. Some of these have been known for years, and were even utilized by the ancients for the preservation of health and the treatment of disease, while others are of modern growth, brought about by advances and improvement in electrical apparatus.

Sunlight.

The finite human mind has difficulty in grasping the rate at which light travels, about 186,000 miles per second, but this dwindles into insignificance before an appreciation of the varying wave-lengths of the visible colors, which have been roughly estimated at one-half to two trillion. Light varies as to speed and wave-length, the division into heat, light and chemical rays being purely relative, one class merging into the other. Light waves are of shorter length than heat waves, but are capable of producing heat if they fall on a suitable object, and meet resistance. It is said that no substance permits all the rays to pass through it, and that no substance is capable of keeping them all out. The blue, violet and ultra-violet rays produce certain chemical changes of value, and are considered true actinic light. Bis calculated that with 100 as a standard the effects of light are, chemical 96, other radiations 4, and says that at the present time it is impossible to state, *exactly*, the action of light. These chemical rays act on silver salts, are absorbed by glass, but pass readily through quartz, rock crystal and Iceland spar. Recent investigations seem to show that rays of every wave-length, from one end of the spectrum to the other, are capable of exerting some chemical actions. Light is a stimulant to both vegetable and animal life. The luminous rays are found mostly



PLATE 166—Indoor Sun Bath (Kellogg)

in the central portion of the spectrum, while the heat rays lie in the lower end. The human body is translucent to these rays. If we hold the fingers over a powerful light, or introduce it into the cavities of the body, the intervening tissues glow and appear as a beautiful red body, this effect being known as translumination.

Physiological Action of Light.

Upon *bacteria*, sunlight and the radiations from the arc are destructive, especially to lower forms, its action being more active in the presence of oxygen, and largely in proportion to the number of ultra-violet rays. Light is, in fact, a disinfectant, killing even tubercle bacilli in a few hours, especially if the sputum is dry. Light serves to maintain health by increasing sanitation. The fact that sunlight will kill many dangerous bacteria is made use of by engineers in purifying the water supply of large cities. It disinfects and destroys both pathogenic and putrefactive organisms, and prevents in the human bacterial and other diseases by increasing both red and white blood corpuscles. The whole human organism reacts and responds to the influence of light. *Upon the skin* strong sunlight acts as an irritant, producing the solar erythema, a dermatitis, ordinarily designated "sun burn," causing it to become red, to swell, sting and pain. Blisters may be formed, and, where the exposure is continued, necrosis may take place. Usually, however, the swelling goes down, the redness diminishes, the blisters dry up and desquamation occurs. Changes similar in character take place under the action of the arc light, several observers having recorded the production of an erythema where an electric welding is done. Where the exposure is continued, deep pigmentation follows, serving as a barrier to further penetration and action in an inflammatory manner. This is known as "tanning," and is believed to result from a destruction of red blood corpuscles, followed by a deposit of their pigment in the skin, nature thereby protecting the delicate structures of the deeper layers of the corium. Sunlight quickly produces profuse perspiration, much more so than an equal temperature acting slowly by conduction. The cutaneous blood-vessels dilate, there is an increased quantity of blood brought to the surface, resulting in active stimulation of the sweat and sebaceous glands, followed by profuse perspiration. This is likewise true of those artificial measures simulating sunshine. The thermic impressions made upon the skin are conveyed to the spinal cord, medulla and higher heat centers in these organs and the brain, accelerating the heart's action. With perspiration heat loss takes place.

In a clear atmosphere the effect of sunlight is intensified. In Egypt the natives, especially the Arabs, protect their heads from the rays of the midday sun by means of large turbans, which form a huge mass,

the heat of which would doubtless be intolerable were it not for the relief afforded by the exclusion of the exciting actinic ray.

A common observation of the influence of sunlight upon the skin may be noted in the difference in appearance between those who are daily exposed to it and fresh air and those who are confined within doors, particularly in ill-ventilated, dark offices, working by gas and other artificial lights. In the former instance, as exhibited by the farmer and seamen, we find the ruddy and tanned skin; in the latter, as exhibited by the bookkeeper, a pale and sallow one.

Upon the nervous system, light energy has a stimulating and buoying influence, speaking in general terms. The spirits of mankind become more cheerful and lively under the influence of sunlight, and cerebral activity is stimulated. The different colors of the spectrum are believed to produce certain effects upon the central nervous system, blue being described as cold, green as restful, yellow as cheerful, red as warm, while Goethe says, "Red and yellow are bracing, green and blue depressing." Blue is believed to quiet cerebral action, and violet to cause sadness—it being one of the accepted emblems of grief. Juettner calls attention to the fact that red is a nerve stimulant *par excellence*, acting upon the sympathetic nervous system, and through this upon all vegetable and more especially the animal functions. It has ever been the color of passion and love, sexuality being affected by it, and it was supposedly for this reason that the lights, gowns and furnishings of the shrines of Venus were of this shade. What was true of the older nations is equally true of the modern ones, and the rules and promptings that guided them in the selection of this color are still in practical effect in modern life to-day.

It is evident that there can be no persistent vitality nor healthfully developed bodily structure without light. If it were possible for a human being to be placed during the natural term of his existence in a position of perfect darkness, the physical tissues and mental faculties would undergo serious modifications and degeneration. Where light is not permitted to permeate, there are found bodily deformities, intellectual deterioration, crime, disease, early and often sudden death. A material as well as a moral and mental etiolation occurs when the vital stimulus of light is withdrawn.

Compare the bright, happy faces and buoyant spirits of those who reside in the country, work in the open fields, and upon whom the sun is generally shining, with the pale, phlegmatic faces, emaciated forms and nervous depression of those whose vocation in life deprives them of the health-giving and beneficial influence of light. These pathological phenomena are observed among those confined in dark places, such as holds of ships, badly constructed houses, cellars, prisons, and wherever light has difficulty in penetrating.

The same conditions are found in the dwellings of the poor in large



PLATE 15—Open Air Gymnasium (Kellogg)



PLATE 36—Open Air Gymnasium (Kellogg).

cities, where the light which finds its way through the narrow and crowded streets is reflected.

The exclusion from light is well known to produce organic alterations in the visual organs of animals, such as atrophy of the optic nerve or those portions of the brain more immediately associated with sight. It is supposed that the blindness observed among fish found in dark caves arises from the arrest in the development of the eyes, as a result of a constant deprivation of light.

The corpuscular richness of the blood and the hemoglobin content are raised by the use of sunlight or the incandescent bath, a fact at once observed by those who will take the trouble to make the simple tests required. I have observed another fact from the use of light—mostly incandescent—that the red cells appear in a fresh specimen, prepared according to the method of Schleip, to be fuller and slightly larger than a specimen taken before the test. This does not apply to the healthy individual, in whose cells no apparent change takes place. The white cells are in greater numbers, and I am inclined to think their activity is increased. *Assimilation and absorption* are increased, as is shown by the gains in weight. This takes place provided the method used does not produce too severe or profuse loss by perspiration. Where it is judiciously combined with tonic (*i.e.*, cold) hydrotherapy, and adapted to the individual requirement, there are few, indeed, who do not add to the body weight. Both animals and man tend to develop and their bodily functions increase. Finsen remarking that the violet rays are veritable promoters of life and energy. Bis has noted the orientation of animals toward the light. Strasser observed that "an animal eliminated more CO_2 under the influence of light than when confined in the dark, and that a starving animal loses less weight at night than during the same number of hours during the daylight. Eggs develop more rapidly when exposed to the influence of sunlight than when kept in the dark. This is also true of the larvæ of insects."

Under the influence of natural light—sunlight—muscular structures are greatly strengthened, a fact that has been noted by Pettenkofer, Voigt and others. With the added absorption of oxygen, proteid in the tissues is consumed, both by actual oxidation and by raising the temperature of the blood.

The best results are obtained when the body is nude. Civilization has ordained the encompassing of man's cutaneous surface in a vast paraphernalia of clothing, so that special preparation must be made so as to meet "nature's requirements," and yet conform to ethics and morality. This ideal state of affairs has been secured by Kellogg.[1] His "open air gymnasium" is:

1 Kellogg, J. H., "Rational Hydrotherapy," p. 968.

"A high-walled enclosure provided with dressing-rooms and all necessary conveniences for out-of-door exercises at all seasons of the year, consisting of the following: A wide walking or running track extending around the outside of the enclosure, just one-tenth of a mile in length; a swimming tank seventy-five feet long, thirty feet wide, eight feet in depth at one end and three feet at the other, with an arrangement for an abundant supply of water, so as to keep the contents of the tank always fresh and clear and at the proper temperature (from 65° to 70°); a supply of wood, saws, axes, and plenty of material in the shape of logs of different sizes, from three inches to three feet in diameter; a large pile of white beach sand for those who wish to indulge in the sand bath; swinging rings, horizontal ladders, a Maypole, appliances for lawn tennis, pitching quoits, and various gymnasium games.

"On entering the outdoor gymnasium the patient removes all his ordinary clothing and dons a thin bathing suit or pair of trunks; shoes, stockings and hats are discarded, for he desires to bring himself as nearly as possible into a state of simple savagery, and to throw off all the unwholesome restraints of conventionalism. A pair of sandals may be worn if desired, but it is better to expose the soles of the feet to contact with the earth and grass. He imagines himself a boy again, frolicking in the freedom of unrestrained activity; he walks, runs, leaps, rolls about on the grass, buries himself in the sand, chops or saws wood, laughs, shouts, whistles, and fairly runs wild with exhilaration as he feels the impulses of new life and vigor thrilling through his nerves and bounding in his veins, and finally plunges into the pool for a swim, which cools and tones his skin. As he returns again to the prison-house of conventional clothing in which civilized human beings are compelled to live, he wishes heartily that civilization and nature had not drifted so far apart.

"The out-door gymnasium is a marvelously potent means for developing the restorative and healing powers of the body, and is the natural complement of the various thermic procedures of the hydriatic method. No sanitarium can be considered as scientifically complete without a well-equipped out-door gymnasium.

"More or less of the benefits of the out-door gymnasium may be obtained by out-of-door exercises, as boating, surf-bathing, swimming, etc. The out-door gymnasium has the advantage, however, that it may be employed at all seasons of the year, that the exercises may be accurately regulated and under the constant supervision of a competent director, and that the seclusion of the gymnasium affords opportunity for a more thorough exposure of the body to the influence of light and air than ordinary out-of-door exercises.

"For feebler patients, carriage riding provides a partial air bath, which may be advantageously utilized while strength for a more vigorous exercise or more considerable degree of exposure is being accumulated. Very feeble patients may be allowed to lie out on verandas, or in sheltered places on cots or reclining chairs. This measure the writer has employed extensively for more than a score of years, and with most excellent results. The patient is as lightly covered as is consistent with comfort; the wraps should consist of white woolen blankets in cold weather, and white fabrics at all seasons, so that as much light as possible may penetrate to the skin. The writer's general instruction to his patients is to spend as much time as possible in the



PLATE 17—Incandescent Electric Light Bath



Plate 18—Incandescent Electric Light Bath, Horizontal.

open air. Simply lying in the cool fresh air promotes appetite and normal metabolism, and greatly adds to the beneficial effects derived from other therapeutic measures."

It is the author's belief that a combination of those measures which enable an exposure of the body to the action of sunlight, the air itself, and cold bathing, is the ideal one for the city dweller who seeks a summer vacation or rest. This is especially true of the bookkeeper, clerk, or professional man who is confined for the major portion of the year within the walls of an artificially heated and lighted building. It is only in natural surroundings that a store of health and vitality can be laid up that will enable individuals to go for a long time along the road of life's struggles without the necessity of combating ill-health. Experience has taught me that it is wise and profitable to send those living at or near the sea-coast to the mountains, the inlander or mountaineer to the sea-shore. In addition all should be enjoined to drink freely of water while undergoing any form of sun or air treatment.

Therapeutic Application.

The therapeutic application of sunlight naturally resolves itself into two categories—to maintain and acquire health. The worn-out, fatigued denizen of the city may look for strength and recuperation from a life under the sun's rays; the anemic and chlorotic girl, the adult with malnutrition, chronic dyspeptics, the rheumatic, gouty and plethoric individual, the diabetic, the neurasthenic, will all find a sun bath of advantage in the treatment of their malady. The different organic processes of the body are stimulated, oxidation takes place more rapidly, health is maintained. Those individuals who have a dry, sallow, leathery sort of skin, who are suffering from the poisoning of retained secretions, may expect from the utilization of the out-door gymnasium, country life with swimming, or a sojourn at the sea-shore, the maximum amount of good, for these measures will improve the quantity and quality of the blood, will eliminate and destroy contained toxins within the system, and promote nervous vitality. Care, of course, should be exercised in habituating one's self to the action of the sun's rays, and, by gradual pigmentation of the skin, secure protection from its dangers. Those who are so situated that they cannot leave business or professional life will be benefited by riding, driving, automobiling, boating, swimming, bicycling, golfing, or any other sport that carries them into the sunlight and fresh air. Where persons are sensitive to the action of light, it may become necessary to train the nervous system to stand exposure. It is best to wear at the start a thin straw hat, substituting for this a light cap, and later on going without any covering upon the head at all. Therapeutic exposure to sunlight should always be followed by the application of

some cooling procedure, any number of which will be described later on in this volume.

In conclusion, it may be said that sunlight is a source of heat; that in its action upon the body it is a powerful tonic; that it increases the hemoglobin of the blood, stimulates and tones the nervous system, favors tissue change, and is destructive in its action upon bacteria.

The Incandescent Electric Light Bath.

The incandescent electric light bath, "artificial sunshine," the introduction of which into therapeutics we owe to Kellogg, is one of the most powerful and beneficial of those treatments placed in the hands of the skilled hydriatist. There is probably no more interesting consideration than the transmutation of energy found in the electric light bath. Let us go back ages upon ages, to the subcarboniferous period, when the vegetation was mammoth, and the "reeds and rushes grew tall and rank" under the sun's rays of that period; when vegetation grew and developed to become the basis of the different coal measures of the present day. With the Titanic upheaval and compression, with the application of heat from unknown regions, this mass of vegetation was compressed and prepared for the utilization of man after his advent upon this earth. Dug from the mines, the black diamond burns, causes its stored sunshine to convert the water into steam; the steam, in its turn, moves the machinery by which the dynamo converts the energy of the coal into "artificial sunshine," and thus we may literally say that we are, when the incandescent light is turned on, basking in the sunlight of the carboniferous era; and this analogy is further carried out in its action and therapeutic application, for it is the nearest approach, in my opinion, to sunshine that we have yet discovered. This form of procedure acts upon the tissues in the same manner as sunlight itself. Instead of slowly entering the tissues by means of conduction, and imperfectly penetrating the skin, the human body permits the rays of electric light to pass readily through the dermis, and thus generate heat in the depths of the tissues, and this it does in a short time and without the depressant action of heat by conduction. That it penetrates the tissues readily can be demonstrated by placing the hand over an ordinary incandescent bulb, when it will be noticed that the soft parts are illuminated. The electric light bath has so many advantages over all other methods of heating that the author feels too much attention cannot be paid to this agent in the treatment of disease. Incandescent electric light is generated by the dynamo, and, passing along a wire properly insulated, enters the bulb, where it meets with resistance. The bulb, a discovery of Edison's, is a vacuum provided with an entrance and exit wire. Within the vacuum a properly constructed terminal offers resistance to the passage of the current, the resistance converting the current into light and heat. The



Plate 39—Incandescent Electric Light Bath, Horizontal (Kellogg)

electric light bath does not depend for all its action upon the heat generated, but mostly upon the light itself, which is radiated from the different bulbs, striking the cutaneous surface. There are two forms of electric light bath of which we shall speak, viz., the incandescent and the arc.

Physiological Action of the Incandescent Electric Light Bath.

This bath is most frequently used for the accumulation of heat upon the surface of the body, and to induce perspiration. It is much superior to any other method, is easily controlled, and the dosage satisfactorily regulated as to duration and intensity. It has an advantage over all other methods, in that the instant the switch controlling the circuit is closed every lamp is brought into play, at once throwing its whole force upon the body. It acts quickly as a heating procedure, bringing about an elevation of body temperature, followed by perspiration.

Action Upon the Skin.—Careful clinical studies made by the author during the past twelve years warrant him in the assertion that this electric light bath stands at the head of all methods as the most satisfactory, safe and efficient way by which perspiration can be induced. By means of its penetration, electric light stimulates directly the blood-vessels of the perspiratory glands and at the same time raises body temperature by its action within the tissues. It is not altogether the action of heat itself upon the surface of the body, but *radiant energy*.

Bouchard has stated that if we elevate the temperature of the blood seven-tenths of a degree Fahrenheit, there will be produced sensible perspiration. This is accomplished in a much shorter time than by any other means of heat application, for the light, penetrating the skin as light, and encountering the resistance of the tissues beneath, has its energy transformed into heat, and it is for this reason that we are able to produce effects with the electric light bath in one-third to one-half the time that is ordinarily necessary when we use other methods. Incidentally, there is an economic side in the saving of time, which is frequently valuable when giving this kind of treatment. Again, I wish to call attention to the fact that the radiant energy of the bath, when used as a heating procedure, is a powerful tonic and not a depressant.

When the body is placed within the apparatus, the skin commences to redden, accompanied by a dilatation of the superficial trunk blood-vessels and small capillaries. Shortly after this, perspiration takes place.

Action Upon Metabolism.—Radiant energy entering the body as it does, acts as a powerful vitalizer and stimulant to cellular activity. That it produces changes in the system analogous to that of sunshine has long been recognized, and it is interesting at this point to note the

observation of Siemens, who found that "when plants and vegetables were exposed to the electric light at nighttime, it was comparable to the sunlight in producing protoplasmic activity," and that "the electric light acts as a tonic to plants, so that they are able to endure adverse conditions which would otherwise cause them to collapse; that the electric light is a true vital stimulus, since the effect of its use at night upon plants is essentially the same as that of the longer day of the arctics upon plants growing in that region." The electric light bath stimulates metabolism, as has been shown by Kellogg in his experiments, proving it to be a reconstructor of tissue and an eliminator of toxins. Elimination of carbon dioxide was markedly increased, although the temperature of the bath was kept constantly below that of the body, viz., 97° F. The urinary secretion showed a diminished amount of urea and total solids during the twenty-four hours, which was evidently the result of increased elimination by the skin, thus stamping this bath as a powerful vicariant, a fact that is borne out by daily clinical experience in the treatment of rheumatism, Bright's and diseases of metabolism. The writer's observations and experiments have shown him that where the electric light bath is used in connection with other hydriatic procedures, there is a marked increase in the excretion of urea and solids in the urine and diminution of uric acid and the uro-toxic group. That nutrition is stimulated by this bath I have experimentally determined by a study of the gains in weight. In some cases this is marked, and occurs in spite of the fact that the patient remains upon a toxic diet—that is to say, a diet in which meat forms a fair proportion of the ingesta. The above changes are enhanced by the action of the rays upon the *blood* itself. The electric light bath produces an increase in hemoglobin as well as red corpuscular richness.

Upon the *nervous system* the electric light bath is a tonic, stimulant and vitalizing process, from which we may expect excellent results in all nervous affections, especially when accompanied by toxemia. These individuals are prone to feel the devitalizing effects of heat, more or less depressing in character, and for this reason the electric light bath, with its tonic influence, is especially adapted as a heating procedure. I have observed that nervous patients more quickly and satisfactorily react to cold water treatment when the application is preceded by the use of this bath.

The action of the *local electric light bath* upon the tissues subjected to its influence, viz., joints, inter-joint structures, abdomen, chest, spine, etc., is the general therapeutic influence of the incandescent bath above enumerated, except that its action is localized within the tissues subjected to its rays. Even where this is limited to a small area, such as a joint, there is, of necessity, a general influence to be derived from its application, and which may be summed



PLATE 20—Incandescent Electric Light Bath Closed (Main)



PLATE 21—Incandescent Electric Light Bath, Open (Main)







Plate 22—Local Incandescent Electric Light Baths (Kellogg)

up in the statement that its primary and local application produces in the locality to which it is applied the same action as a general application, with mild secondary systemic effects.

The Arc Light Bath.

In the arc light bath we have to deal with an active energy that is considerable. The heat from the arc is intense, the active horse-power energy of which is said to be greater than that of the effective rays of the sun at the earth's surface—that is to say, the surface of the sun radiates 10,000 horse power per square foot of its surface, but the earth receives only one-third horse power per square foot, of which about one-third is absorbed into the atmosphere. An arc having a crater of one-twelfth of an inch is estimated to radiate about 12,000 horse power energy, which is in excess of the sun's power. The brightest part of an arc is a small area within the crater of the positive carbon, the temperature of which is approximately from 6,300° to 6,900° F. It is from that spot that the greater part of the energy is derived, and which compares with the sun in brightness. In the arc light we have to deal more particularly with the actinic or chemical rays of light, and it is from their influence that we may expect benefit to the diseased human body. While the arc light emits powerful and stimulating rays, still it does not compare for general use with the incandescent bath.

In its physiological action upon the surface of the body the skin is stimulated—even irritated—by its rays, resulting in a dilatation of the capillaries and larger blood-vessels, accompanied by a rise in temperature and active fluxion of blood to the surface. Perspiration is induced, and, where the heat of the arc light is retained, we have superadded all the influences that arise from heat of any kind, with the added advantage of its vitalizing action. I consider the arc light better suited for *localized* treatments, especially superficial in character.

Actinic rays emanating from the arc light are germicidal in their action, and are destructive to bacteria upon the surface of the skin, as in lupus, though they do not penetrate beneath the surface. The aim in the arc light bath is not so much the production of heat effects as the more purely actinic surface action. The arc light bath is, as a rule, little used by hydriatists, but belongs more particularly to another field or specialty.

Technique.—Many electric light baths are now constructed and upon the market, and from which the intending purchaser can select, but certain rules should be borne in mind. It is essential that the wood entering into its composition should be preferably of oak, well seasoned, and, in addition, kiln dried. The wires entering the cabinet and connected with the different incandescent lights must

be large, well insulated, and where a connection is made the connection should be soldered and the joint well taped. I personally prefer the Edison or screw base for the globe itself, as I believe in this way the light is more secure and a better contact made. In cities the alternating current is generally used, with a voltage from 52 to 110, the latter, for a number of reasons, being preferable, as it gives a steadier light, somewhat more intense in its action.

In 1895 the author constructed his first electric light bath, and has deviated little from the model he then adopted. I have always believed in a superabundance of lights; in fact, twice as many as are really necessary, so that almost any degree of heat or light effects may be obtained. The cabinet I now use can be constructed by any really good mechanic. It is 4x4 feet, with a floor on the inside at such a height as to make it comfortable for one to sit upon a revolving stool with the head outside. A door of sufficient size opens to admit the entrance of the patient. The interior is lined with asbestos and is supplied with 188 16-candle power lights arranged in vertical rows equidistant from one another, with the exception that there are two double rows placed opposite the spine of the patient. The lights are mounted upon porcelain bases, and between them are placed French plate glass mirrors so that there may be multiplication by reflection. The wiring is carried through the cabinet in porcelain conduits to a switch-board, of which I shall speak later. A false outer shell covers the wires and conduits, so as to give the cabinet a pleasing appearance. The switch-board has snap or double knife-blade switches, one for every row of lights. The advantage of this is at once apparent, as the physician is enabled to regulate the number of lights and grade the intensity of the application. It is advantageous to have a very large double knife-blade switch on the main wires of the current, but the novice should remember never to throw in this large switch when the smaller switches are all turned on, as he may "blow out" the fuse now required upon all such currents.

In practice the patient enters the bath and takes his seat upon the revolving piano stool, which can be raised or lowered to suit the body length. His spine is uniformly exposed to that portion of the cabinet containing the double row of lights. The board is dropped into place around the neck and the door closed; a large towel is then put loosely around the neck to prevent the escape of heat. This is a small matter, but it is an exceedingly disagreeable one to a patient to have the hot air of the cabinet stream in front of his face, and I have known cases to be made faint by just such a neglect of detail. In the case of men a cold cloth or ice-cap is placed upon the head; women may wear an oil-silk or rubber cap, over which is placed the ice-cap or cold cloth, or, what is better, have a cold towel wrapped around the upper neck or throat. Recently I



PLATE 28—Light and Arc Cabinet Combined, Open (Model E).



PLATE 28—Light and Art Cabinet Combined, Closed (Morell)

have used with much satisfaction a rubber helmet which has a sufficiently large mouth to permit small pieces of ice to be introduced. This helmet keeps the head cool, does not wet the hair, and is especially appreciated by ladies. As a result I have entirely dispensed with the turban, pail or cold collar in my practice.

This is done for the purpose of preventing the fluxion of blood to the head, which would be followed by faintness, vertigo, palpitation, etc. The duration of the bath will depend upon the individual case, but ranges somewhere between three and twenty minutes. It is a common fact that cases at the start require very much longer exposure to the action of the bath, and that as improvement takes place there is a more rapid and prompt response of the body to the influence of the light, and therefore the duration becomes lessened. The incandescent bath may be used in two ways. Where the patient is only permitted to remain in the cabinet until the skin is flooded with blood, but perspiration *has not taken place*, a powerful tonic and stimulating procedure takes place without many of the eliminative and other actions heretofore described. Where the patient remains until free perspiration takes place the physiological action above described is the result.

In the author's hands the incandescent electric light bath is merely an associative procedure, a measure by means of which he stimulates, vitalizes and prepares his patient for hydriatic methods, of which the reader will find any number described in later chapters of this work.

Therapeutic Application.—As indicated above, the author has found the incandescent electric light bath to be the most successful of all known methods as a preliminary to further hydriatic measures and for the application of heat to the general body surface. In localized procedures I have had better success with superheated dry hot air. The adaptability of the light bath to every case is easily accomplished by means of the switch-board; by changing the number of lamps the intensity of the bath is regulated. This bath is instantly, absolutely and positively under the control of the operator. In an electric light bath of short duration, *followed* by any of the cold percutient measures hereafter described, we have a combination of effects far reaching in their action and of marvelous reconstructive capacity. Where the bath is continued until free perspiration takes place the patient should remain from five to fifteen minutes, but in any event must be followed by some cooling application. I have found the combination of the electric light bath with hydriatics one of the most powerful known measures *for overcoming* anæmia and chlorotic conditions, especially in young women. As an enhancer of appetite, increasing digestive capacity and overcoming intestinal torpor, it is the remedy *par excellence*. Those suffering from gout, lithæmia, rheumatism (acute and chronic), the uric acid diathesis,

myositis and myalgia dependent upon these conditions, will find relief in the painstaking and persistent application of these measures. In neurasthenia, hysteria, insomnia, neuralgia, neuritis, migraine, chorea, and all functional nervous troubles, it is invaluable. I consider the electric light bath and hydriatic procedures for chronic malaria and syphilis, as a supplement to the use of quinine, mercury and the iodides, unequaled by any other known therapeutic resource. The local electric light bath is useful in the treatment of painful conditions and local disorders. It is of special use in spinal neuralgias, spinal irritation, lumbago, localized pains of all kinds, etc., but after its application either localized or general applications of cold should be made.

For the application of the arc light in therapeutics the reader is referred to the cut of the combined incandescent and arc bath, either of which can be used singly. As heretofore indicated, the arc light bath finds its greatest usefulness in skin affections, neurasthenia and general debility and in painful nervous states.

Hot Air Cabinet; Turkish Bath; Vapor Cabinet; Russian Bath; and Superheated Dry Hot Air.

I have grouped these procedures under one general heading, as the physiological action of each is practically the same, the minor differences being of such a nature as not to invalidate the added value of considering them collectively. They differ essentially and radically from the action of sunlight and radiant energy, in that the applications produce their results by directly communicating heat to the surface and from there entering the tissues by conduction.

A human being can tolerate a water bath at a temperature of 113° F. (45° C.) for eight minutes' duration with danger to life, while a general hot-air bath at a temperature of 260° F. (127° C.) for eight minutes is well borne, and temperatures far exceeding this—350° and 400° F.—can be applied to the general surface or localized, provided certain precautions are taken. Of all these baths the Turkish is the oldest. The physiological action of the Turkish bath and the hot-air cabinet is practically the same, with the added advantage in favor of the cabinet, though, as I will show later on, the cabinet in the home is very much abused. The user of the cabinet inhales fresh air and the pulmonary mucous membrane is not subjected to the direct action of the hot air itself. Perspiration is more rapid in the hot-air bath and in the superheated dry hot air and least so in the presence of steam; in fact, the presence of water of any kind interferes with the secretion of perspiration. The North American Indians used to improvise a Russian bath by pouring water upon heated stones, and in Finland the same process is followed to-day.



PLATE 25—Superheated Dry Hot Air, Body Apparatus; Sliding Table Tilted to Show Openings

The Eskimo uses hot air, building a fire in his hut, raising the air of the chamber to such a temperature as to produce free and active perspiration. The Finns and Eskimos suddenly leave their apartments and plunge into the snow, a somewhat rigorous procedure. All these baths must be followed by some temperature-reducing method, any number of which will be found in a subsequent chapter.

Physiological Action of Heat by Conduction.

The primary physiological influence of hot air or steam upon the body is the result of thermic irritation conducted to the structures and tissues beneath the integument. When a person enters the hot-air room or steps into the cabinet, after a short or longer period of time, usually from three to ten minutes, the surface of the body begins to become warm. Gradually the layers of the skin absorb the heat until it reaches the lower structures and acts upon the blood-vessels themselves. The skin then fills with blood, the perspiratory glands begin to discharge their secretion upon the surface, at the start in the nature of a dampness, later along in beads, as the fluids of the body are more freely directed toward the surface. Thirst is now, as a rule, experienced, and the patient should be made to drink freely of plain or carbonated water. Heat thus applied is for a short time a vital stimulant, acting upon all the structures, tissues and glands with which it is brought in contact, but only of a temporary nature, and is followed by its natural or secondary effect, viz., depression. This depressant or atonic effect is disagreeable, and must be carefully guarded against. In the Turkish bath the inhalation of the dry hot air not only excites the skin, but stimulates the enormous area of the pulmonary circulation, and to a certain extent favors the elimination of toxins by this membrane. Its action upon the skin remains for some hours after the bath.

The value of sweating as an eliminative measure is perhaps not so great as it has been popularly believed to be, the percentage of urea and other toxins contained in the sweat, especially when profuse perspiration is induced, is small—indeed, very small—when compared with the percentage of these tissue poisons as ordinarily found in the urine. However, under some circumstances, they are carried off through the skin, as is evidenced by the peculiar urinous odor noticeable when profuse perspiration is induced in a patient suffering from renal insufficiency.

The sweating-bath (followed by a cold application), though by no means a perfect substitute, does, nevertheless, to a very considerable degree relieve the system of the excrementitious wastes which accumulate within the body when a sufficient amount of exercise is not habitually taken. This is accomplished by increasing oxidation and renewing the body by stimulating tissue changes. Sweating

softens the sebaceous matter which often accumulates in the ducts of the skin and loosens the dry epithelium that obstructs the outlets of the perspiratory ducts.

It is practically impossible to effect a permanent cure in a large number of chronic disorders without first restoring the skin to a normal state. Diseased conditions are common among civilized races because of the influence of clothing and the neglect of a daily bath. Sweating-baths are of the highest value as a means of ridding the skin of its accumulated impurities, opening up the obstructed lymph-channels and spaces, encouraging the circulation of nutritive fluids, stimulating gland structures, unloading obstructed sebaceous follicles of their hardened contents, arousing to activity the nerve ganglia and secreting cells of internal organs through reflex movements set up by the cutaneous sensory impressions made, and relieving by skin activity visceral congestion and other functional disturbances.

Respiration is increased in frequency in from three to five minutes, and becomes more superficial and supracostal in character. For a while there is more or less oppression until relief is afforded by the breaking out of perspiration and the elimination of moisture from the 2,000 square feet of pulmonary mucous membrane. With the watery vapor escape CO_2 and toxic substances, volatile in their nature, to which Charrin has called our attention. The probable explanation of the physiological increase of respiration during the application of these measures to the surface is to be found in a combination of factors—irritation of the peripheral nerve terminations, superheated blood carried to the vagus respiratory center in the medulla, an increase of carbon dioxide demanding respiratory action to permit of oxygen absorption.

Heat profoundly affects the circulation. After the patient enters the bath the pulse-rate begins to increase, and in from five to ten minutes it may rise from twenty to fifty beats. A continuance of the application causes an active congestion of the skin, which, with the induction of perspiration, becomes soft and lax. The arterial trunk and capillaries become distended with blood, especially the latter, for, possessing only a thin cellular membrane, they are capable of enormous dilatation and expansion, frequently several times their normal size. With the increased activity of the circulation in the skin, with the acceleration of the pulse, blood pressure is lowered, a fact discernible by the finger and sphygmomanometer. Owing to the lessened resistance of the peripheral arterial system, the blood stream is propelled with less labor to the surface and anemia of the internal viscera takes place, especially of the brain. A sensation of faintness, vertigo and tinnitus is far more common in Turkish and Russian than in the cabinet bath, because in the latter the head is kept cool and fresh air respired. With free perspiration the pulse-



Plate 3—Superheated Dry Hot Air, Body Apparatus; Ready for Patient.

rate diminishes some, relaxation takes place and the oppression and discomfort disappear.

The first effect of these applications upon the nervous system is that of a stimulant, exciting the nerve centers through reflex action arising from impressions made by the thermic irritation upon the skin. This is of short duration and is followed by a peculiarly agreeable sensation of ease and languor. Continued for a longer period of time, exhaustive symptoms begin to appear, notably lassitude, mental as well as muscular, the ultimate end of which is intense depression.

The multitude of thermic impressions that arise from heating procedures act reflexly upon the central nervous system, assisted by the direct action of the heated blood upon the nerve centers themselves.

The anemia resulting from the increased circulation in the skin is an added feature. Its action upon voluntary and involuntary *muscular fibre* is the same. A short general application of heat is stimulant in practically the same manner as a short application of cold, while its prolonged use has the reverse effect, lowering tone, energy and relaxing the fibers. This fact is utilized clinically by the medical fraternity, and laity as well, in the treatment of muscular cramps, especially those of the intestines, and by the surgeon in overcoming strangulated hernia and retention of urine.

The lassitude that accompanies a general application of heat is to be explained by its depressing nerve effects and to the relaxation of muscular tissue itself.

Upon the *blood* heat diminishes the number of red cells and increases the leucocytes, and this is true whether the application be general or local, though local leucocytosis is much more marked after localized procedures than general applications. The alkalinity of the blood is lessened, diminishing its vital resistance and increasing its toxicity, with the production of active perspiration, and, provided water is not drunk, the general volume of the blood is lessened, due to actual water loss.

The influence of heat upon the *digestive apparatus* is a secondary one, for where it is not followed by the proper after-treatment there is a relaxation of the musculature of the entire tract, with a retention of gases, indigestion and fermentation, the latter giving rise to putrefactive processes, from which auto-intoxication takes place. The liver is little affected, although there is a tendency to diminish and thicken the biliary secretion.

The action of heat upon *metabolism* is a frequent clinical observation. An elevation of temperature and increased circulatory activity favor oxidative processes and carbon dioxide formation. By the action of prolonged heat some fat combustion takes place, and in the reduction of obese persons this measure, together with the restriction

of fluids, is frequently employed. The various end-products circulating in the blood are oxidized and put in more favorable condition for the action of the eliminative organs.

Experiments show that the elevation of temperature induced by general hot applications aids the body in the formation of alexins and antitoxins. Animals suffering from infectious diseases live longer when subjected to the influence of moderate heat. The recognition of this fact has led to the revival of the dictum of Hippocrates, that the elevation of temperature that occurs in connection with most acute infectious diseases is, within limits, remedial in purpose and effect. By parallel reasoning we are led to the conclusion that a slight degree of pyrexia artificially induced by a general hot application may be beneficial in aiding resistance to infection, especially when followed by a short cold bath.

Elimination is enhanced. By oxidative processes toxic groups are converted into urea, and this end-product is eliminated in larger quantities for some days, even after the application of one bath. Uric acid itself is eliminated, due to an absorption into the circulating medium of that which is stored in the tissues, its greatest elimination being shortly after the bath; the chlorides, sulphuric and phosphoric acids and extractives are favorably influenced. The quantity of urinary water lessens somewhat in proportion to the quantity of perspiration induced.

Local superheated dry hot air produces primarily an agreeable sensation of warmth and relaxation. This is followed, in a short time, by a marked increase in the quantity of blood circulating in the vascular stems and capillaries of the part subjected to the heat. Relaxation, copious perspiration and elevation of the temperature of the blood take place. Moderate general perspiration ensues. The active perspiration of the part eliminates a great many toxic materials, both organic and inorganic, and this is of value in the treatment of localized infections. Upon the nervous system it acts reflexly, checking pain in a marvelous way. In the writer's somewhat extended experience of eighteen years nothing has proved more gratifying to him than the influence of superheated dry hot air locally for the relief of pain and paresthetic sensations which so frequently accompany painful states. Reflexly, the pulse-rate and respiration are slightly accelerated by localized applications of dry hot air. These applications produce profound trophic influences upon the part, especially observable in the improved nutrition that takes place in gouty extremities and around the joints of arthritis deformans. That it enhances function, increases tissue resistance and stimulates reconstruction is a constant observation. Upon the lymphatic system dry hot air increases the flow along its channels, whipping up glandular action, and thereby aiding in the removal of waste products. The elevation of temperature to which the part is subjected favors oxidation and the destruction of effete materials. It may be stated that,



Plate 27—Superheated Dry Hot Air Body Apparatus; Patient in Position to be Slid Into Cylinder.



Plate 28—Superheated Dry Hot Air: Body Apparatus; Patient Taking Treatment.

barring the intense local effects, the general influence is that heretofore enumerated in the preceding pages of this chapter. I have, so far, failed to notice in the literature of this subject the application of localized cooling methods after the use of this agent. In the limb, or part subjected to the heat, are greatly relaxed blood-vessels and tissues, and it is necessary, in order to produce reaction and maintain the blood in the part, that the treatment should be followed by a brief application of some tonic and temperature-abstracting procedure; otherwise the part will become gradually chilled by evaporation of perspiration and the condition may be aggravated rather than helped. The writer has found it of considerable value to not only use a localized application of cold, but a general systemic one.

Apparatus and Technique.

The apparatus and the methods here described of necessity limit their use to sanatoria, institutions and hospitals provided with a thorough and complete outfit, which, the writer is sorry to confess, is a rarity when we consider the number of private, public, special and general hospitals and sanatoria. In considering technique it must be borne in mind that the greatest care should be exercised to avoid burning the patient. Persons who have carelessly used these treatments have sometimes sacrificed lives by improper methods of application. The use of "home" methods by the patient alone necessitates a labor that should be performed by another, to say nothing of the risk of conflagration and personal burning. Private homes have no facilities for after-treatment, nor is the temperature of the room, as a rule, kept sufficiently high to prevent evil consequences following its use. It is the writer's firm belief that apparatus using gasoline, kerosene, alcohol and others of this group should be used in private homes with great care, and never countenanced in public sanatoria.

Hot-Air Cabinet.—The apparatus is constructed of wood, preferably of three layers. The inner perpendicular layer of lumber is best made of tongue and grooved poplar, upon which is tacked asbestos; over this a thin sheet of poplar is nailed horizontally, another layer of tar or heavy building paper added and a second perpendicular row of tongue and grooved poplar screwed upon the outside. The floor, four sides and the stationary part of the top are to be so constructed, the whole to be painted inside and out with fireproof white paint. Upon one side a narrow perpendicular door (or two) swings upon hinges just wide enough for a person to comfortably enter the cabinet and sit upon a stool, which should have a revolving seat so that it can be raised and lowered to accommodate the patient. In the top a circular hole is cut of proper dimensions to permit of the head remaining outside the cabinet and a loose removable board to allow of the patient taking his seat, after which it can be adjusted comfortably

around the neck. My own predilection is for the use of the steam-pipe radiator, and I thoroughly agree with Baruch that this is by far the best and simplest method for applying heat in the hot-air cabinet. Of course, heat may be forced into the cabinet, but from a practical standpoint the former is much preferred. A large excess of radiating steam coil surface should be placed in the cabinet, as it is a very easy matter to reduce temperature when it is desired. As a matter of economy, if it is so desired and the bath has been properly constructed as above outlined, it can be used for a Russian vapor cabinet as well, all that is necessary being to have an open pipe or several openings by means of which the steam may enter the cabinet. I have never favored the use of steam, nor do I consider the Russian bath a valuable one, but from experience restrict my work to hot air and radiant energy.

The patient, nude, enters the cabinet and seats himself comfortably upon the stool so that his chin is just above the outside level of the cabinet. The attendant adjusts the loose boards snugly, and also wraps a large Turkish towel around the neck to prevent escape of heat, which would reduce the temperature of the bath and also be exceedingly unpleasant to the patient. The door is closed, the steam turned into the radiating coil and the cabinet gradually heated to such a point as is desired. The temperature may be controlled by means of a valve which permits of a larger or smaller quantity of steam entering the coil. The patient's head should be enveloped in a wet cloth, turban or ice helmet. The usual temperature of such a bath ranges from 150° to 200° F. and its duration depends entirely upon the case in hand. Where stimulation is desired it should be continued until perspiration is barely detectable; if, on the contrary, the full effects heretofore described are to be obtained, it should be continued until free perspiration takes place. The main difference and distinction between the action of this and the Turkish bath is that the patient inhales cool fresh air while the surface of his body is exposed to the heat. Owing to the fact that hot air is not inhaled, the cabinet is somewhat slower in its action than that of the Turkish bath, and much safer.

Turkish Bath.—In the Turkish bath the bather enters the dressing room, removes the clothes, and, throwing a sheet around him, prepares to enter the hot-air room. He should first wet the face and hair of the head thoroughly and drink at least one or two glasses of cold water. He then enters the hot-air room and lies down upon a couch. For a few moments there is a sensation of oppression, but usually by the end of from five to fifteen minutes he begins to perspire and relief is experienced. The air of this room is most frequently heated by steam coils, and in this respect is most unhygienic and disagreeable, as the different persons entering the room are more or less compelled to inhale the contaminating air of the chamber. The best method of heating is with currents of hot air, by means of which ventilation is



Plate 37—Superheated Dry Hot Air; Local Application; Foot Bandaged in Turkish Toweling Ready to be Introduced.



Plate 38—Superheated Dry Hot Air; Treating Foot.



PLATE 31—Superheated Dry Hot Air; Treating Head and Arm



PLATE 32—Superheated Dry Hot Air; Treating Knee with Special Apparatus for this Joint

secured and fresh hot air introduced, it being the idea of modern furnace heating. The hot air should enter at a point several feet below the ceiling, and the foul air vents that carry away the impurities be located near the floor. Users of the Turkish bath, should they fail to perspire, must at once leave the hot-air room, as injury may be sustained by too long exposure to such intense heat without the safety valve of perspiration, there being danger of heat-stroke taking place. Most Turkish baths have a second or very hot room whose temperature ranges from 140° to 180°. After free perspiration has been induced, the bather may enter for a few moments the very hot temperature above mentioned in order to induce vigorous or excessive perspiration. From this chamber he enters the shampoo room, is placed upon a slab of marble with a rubber air-pillow under his head. The attendant usually commences by dipping his hands in very hot water, rubbing the entire cutaneous surface with his hands alone. He then shampoos the bather with soap, commencing with the upper extremities and systematically going over the entire body. This may be done with a brush of hair, rubber, flax or other fibrous material. This process is continued until all the superficial epidermis has been removed and the skin feels smooth and slick. The attendant then uses a small hose to which a nozzle with many perforations is attached to remove the soap and cleanse the body. He then proceeds to knead and roll the muscles of the upper and lower extremities and trunk, after which he again sprays the patient, gradually reducing the temperature of the water to about 80°. The bather is then conducted to the douche, which may be either the rain bath, circular needle or jet, and given a short vigorous cold application. He is then quickly rubbed down, a sheet is thrown around him and he enters the cooling room; here the attendant starts with the head and carefully dries the hair, then in succession the extremities and trunk. It is likely that there will be secondary perspiration after the patient enters the cooling room. If there is much difficulty in drying the hair, or perspiration continues, an alcohol rub is frequently added. The patient should remain in the cooling room until he is perfectly dry and pulse and respiration have reached the normal. He dresses slowly and avoids exertion for some time after the bath.

The Turkish bath is a powerful procedure, and with the strong it may be used twice weekly; with the feeble never more than once a week. This bath is a very ancient one, and was the bath of all others most in vogue by the Romans, the ruins of whose thermæ to-day give some idea of the immense extent to which this luxurious race utilized the bath. This is especially true of the thermæ of Caracalla, which have heretofore been described.

The Russian Bath.—The Russian bath is usually given in Turkish-bath establishments, a room being set apart for this purpose. In my

opinion, it is the least valuable of all methods of applying heat by conduction. In this bath the patient lies upon a marble slab in a small room filled with the vapor of steam. The temperature is usually kept between 115° and 125° F. It will be noted that the bather cannot stand high moist temperatures; in fact, 135° or 140° F. is trying to most persons. The bather, lying upon the slab, is rubbed by the attendant with a view of stimulating an active flow of perspiration. The same rules that are applicable to the Turkish bath with regard to preparation and after-treatment apply with equal force to the Russian bath.

Superheated Dry Hot Air.—The use of this measure is of recent date, and was first introduced about ten or twelve years ago in England, through what is known as the "Tallerman-Scheffield local hot air bath." The writer has before him the original communication (*London Lancet*) with regard to this method, and it is interesting to note the improvements that have been made in technique, apparatus and results, but justice must be done in giving credit to the original idea of these workers. To-day many kinds of apparatus are upon the market for the local and general application of high temperatures of dry hot air, but those used by the author, whose cuts are shown herewith, have always given him satisfaction and most excellent results. The essential basis of construction in the local as well as body apparatus is an arrangement by means of which very high temperatures of hot air may be made to circulate through a cylinder composed of copper, steel or other metal. The apparatus is so constructed that applications may be made to the body or extremities without the part coming in contact with the heated metal of the cylinder.

In local applications, the part is carefully wrapped in Turkish toweling and covered with a glove or stocking made out of the same material. It is then placed in the hot-air apparatus upon a stand, made usually of asbestos, the curtains being carefully drawn around the limb, so as to prevent the escape of heat. In practice the gas jet is first lighted and the apparatus allowed to warm up; the limb is then introduced as above described, and allowed to remain from thirty to sixty minutes, after which it is removed and treated.

The body apparatus made by Betz is, in my opinion, the best apparatus upon the market, and, as is seen in the picture, it is a metal cylinder with a stretcher board rolling upon a metal track. In practice the patient, wearing a Turkish bath-robe, slips on a pair of mits and stockinettes made out of Turkish toweling, a sheet of similar material is wrapped around him and then run in the cylinder, the apron neatly tucked and adjusted around the neck, and a wet turban or ice helmet placed upon the head, which is made comfortable with the pneumatic pillow. The gas jets are then lighted (the writer uses natural gas) and the valves in the top opened. The



Plate 33—Superheated Dry Hot Air: Treating Hip.



Plate 34—Superheated Dry Hot Air: Treating Back.

temperature of this bath, to obtain the best results, should range between 240° and 300° F., a fair average being 275°. Certain facts should be borne in mind in the technique, one of which is to be liberal in wrapping the body and extremities for these applications. Water must be accessible, so that the patient, should it be deemed advisable, can drink freely. The head is kept cool and the face sponged. Women may wear the gutta-percha cap, so that the hair will not become dampened, and upon the forehead and around the neck a cold compress is applied. Every endeavor should be made to make the patient comfortable. See that the chair or lounge in local applications is at the right height and producing no strain upon other joints; in the body apparatus spare no pains to secure proper and comfortable elevation of the head. Do not permit hot air to stream over the patient's face. In plethoric men and women a cold compress around the neck is a valuable aid in relieving oppression. If there is no special reason for doing otherwise, the patient should lie upon the back, but where the aim is to treat conditions involving the spine or back muscles the patient may recline upon the abdomen. It is advisable from time to time to raise the limbs without uncovering them, in order to secure free circulation of the hot air about the entire person. The duration of this bath ranges from twenty to sixty minutes, with temperatures of 240° to 300°. When the treatment is over the apron is thrown aside and the stretcher rolled out to its full length. It is generally my plan to then permit the patient to recline upon the sofa or massage-table for a few moments. Usually there is a fresh accession of perspiration upon leaving the apparatus. At this point, general massage, vibration, etc., may be applied. The author, when using the body apparatus, never uses either, but prefers to have the patient enter a needle or circular rain bath at a temperature of 100°, which is gradually reduced until sufficient heat abstraction has taken place. Reaction occurring, the patient is then rubbed down, and allowed to rest until perfectly dry. It has been my experience that these treatments are most successful when exercise is not taken immediately after them, but rather they should be succeeded by rest. First treatments should be of short duration, so that we may have an opportunity of studying the patient's reactive capacities. Increase gradually each succeeding treatment. Many patients can bear much higher temperatures where the head and neck are kept cool, and it may be reiterated here that comfort soon overcomes nervous dread and apprehension. It is astounding sometimes what tactful management of cases will do to overcome a patient's fears.

Therapeutics.—There is a wide therapeutic field for this method in many kinds and classes of diseases. Care should be taken, however, to investigate carefully the condition of the circulation, heart and respira-

tion. Many cases that can stand the hot-air cabinet and superheated dry hot air cannot endure or gain benefit from the use of the Turkish or Russian bath.

Superheated dry hot air is not as good a method as the electric light bath for warming patients before the use of cold applications. This is equally true of the steam vapor cabinet. In rheumatism, gout, arthritis and the uric acid diathesis it should be more utilized than it is at the present time, especially where followed by hydriatic measures which tend to produce tonic conditions of the circulation.

The Turkish bath and body apparatus of superheated dry hot air are excellent methods for the reduction of obesity, and the author has obtained benefit in diabetes from their use, combined with Swedish resistive exercises. In diseases of the kidney, where these organs are crippled and elimination is defective, superheated dry hot air has yielded me results far beyond my anticipations, though care should be exercised in subsequent cooling. In constitutional blood states, metallic poisoning, scrofula and syphilis, excellent results may be expected. Superheated dry hot air has, in my hands, given results more nearly resembling the hot springs of this country and Europe than any other treatment. In general infective conditions, in acute inflammations of the lung, pleura, intestines, etc., superheated dry hot air is indicated. In chronic nervous diseases, neurasthenia, hysteria, neuritis, neuralgia, functional rather than organic troubles are benefited by the hot-air cabinet and superheated dry hot air. Nervous patients do not, as a rule, stand the Turkish bath well, but take the same temperatures, where the head is exposed, with impunity. In myelitis the judicious use of dry hot air is valuable, but I wish to enter a strong protest against the use of these measures in locomotor ataxia, spinal and cerebral paralysis, etc. Chronic dyspeptics of all kinds are helped by hot air or superheated dry hot air; the anemic and chlorotic also. For the elimination of mercury there is nothing, in my mind, comparable to the action of the body apparatus and the incandescent electric light bath. As a means of preserving health, strengthening the resistive powers against the encroachment of disease, and for overcoming the results of a sedentary life, these methods are of considerable value.

The local application of superheated dry hot air has proved by far the most satisfactory means for the treatment of the joint affections that accompany gout, acute or chronic articular rheumatism, synovitis, fibrous ankylosis, sprains, rheumatoid arthritis, joint tuberculosis, etc. In localized infections its influence is almost marvelously curative.



PLATE 35—Hot Air Cabinet



PLATE 36—Hot Air Cabinet in Use.

CHAPTER VI.

MINOR HYDROTHERAPEUTIC METHODS.

The methods described in this chapter have in themselves only moderate curative value, and are therefore classified by me as "minor hydrotherapeutic methods." They are, however, very useful for the temporary relief of localized inflammation and functional pain. Many are daily utilized by the laity, who apply them without consultation with the physician. They possess little, if any, systemic influence. The commonest application is that of heat, which may be applied by means of the hot-water bag, bottle, jug, sand-bag, salt-bag, bran-bag, bricks, blocks of wood, stove lids, flat irons and coil—in fact, almost any way in which heat can be retained. All objects used should be wrapped before applying. The immediate effect of localized heat is to gradually raise the temperature of the part brought in contact with it, the part to which heat is applied being warmed to a considerable depth. Circulation is increased and the temperature slightly raised by dilatation and increased activity of the blood current. Metabolism is stimulated, exudation and suppuration favored. Its action upon the nervous system is that of a sedative, relieving pain by its combined influence upon the cutaneous nerves, relieving pressure and relaxing muscles.

Local cold effects are the reverse of those of heat, with some few exceptions. The local application of cold does not influence the general body temperature nor produce general effects. It reduces the temperature of the part until it reaches that of the thermic medium, lessening the circulation in the part, reducing temperature by contracting the blood-vessels and slowing the blood-stream. Exudation, pus formation and metabolism are retarded. Upon the nervous system cold may likewise produce a sedative influence, due to its numbing action upon the nerves within the skin. Especially in those painful states produced by localized inflammations we may expect considerable relief from the application of cold. There is one localized application of cold, however, that may produce a general lowering of the temperature, and this is the much used cerebral coil or coil cap. This consists of a thin rubber basis upon which is wound a rubber tube through which the water flows. The cap is adjusted to the head. The general reduction of temperature is due to its influence upon the thermogenetic centers located within the brain. This is one of the reasons why it tends to lower temperature in meningitis, in addition to its localized action as an abstractor of heat.

Heat and cold may both be applied to any part by simply wrapping around a small rubber hose attached to a proper reservoir which permits the flow of water through the tube. All localized applications of heat and cold are better tolerated where a thin compress is placed between them and the skin.

Chapman's Methods and Bags.

At the head of minor hydrotherapeutic measures stands the application of ice and hot water to the spine, first brought to notice by Dr. John Chapman, of Paris, France. I had the pleasure of knowing Dr. Chapman during my sojourn in Paris in 1889, and was in this way early brought in close touch with his ideas and work. From time to time since then I have utilized his methods. My own experience with regard to the efficacy of his treatment is to substantiate the proposition laid down by him in his works, but I have so far not been able to secure the curative results that he claims for the persistent application of the method. The essential feature is the use of a single-, double- or three-compartmented rubber ice-bag, these compartments being superimposed upon one another with the idea of preventing the accumulation of ice at the lower part of the bag alone. These bags are of sufficient width—say about four inches—to cover the entire spinal area, embracing, as he says, the spinal cord itself and the sympathetic ganglia lying adjacent to it.

The sympathetic system consists of a series of ganglia connected together by intervening cords, extending on each side of the vertebral column from the base of the skull to the coccyx. There are a number of ganglia of this character associated with the cranial nerves. Each ganglion may be regarded as a center from which branches and impulses pass in various directions. These ganglia are intimately connected with the organic processes of life, and follow the blood-vessels to their finest ramifications. The cut gives at once a bird's-eye view of the distribution and physiological association of sympathetic nerves. Independent functions are found in connection with the nerve plexuses formed by the junction of numerous branches of nerve fibers into a central ganglion in different localities. These nerves and plexuses are connected intimately with the central nervous system. They govern the so-called organic functions of the heart, abdominal viscera, especially those of the stomach, intestine, uterus, Fallopian tubes, etc. It will be borne in mind, however, that as far as its vasomotor function is concerned this is derived from the central nervous system and passed into the plexuses, and that the nerves originating from the plexus carry these impulses to the terminal blood-vessels.

It is Chapman's theory that ice applied in rubber bags of the right



PLATE 37—Chapman's Spinal Ice Bags; Chapman's Double Column Spinal Hot Water Bag; Ordinary Hot Water Bottle.

length and proper width, placed over the sympathetic centers located in the spinal column, dilates the arterioles controlled by the said centers, arrests hypersecretion of glandular organs, checks spasmodic and irregular muscular movements of the voluntary and involuntary muscles, and by its sedative action upon trophic centers arrests hypernutrition. The action of heat is diametrically opposed, viz., it contracts the arterioles, increases the secretion from the glandular system, increases muscular movement, voluntary and involuntary, and by its action upon the trophic centers increases nutrition. He says: "But as the sympathetic and cerebro-spinal nervous systems are so intimately related, and, indeed, inextricably and undistinguishably blended, both in structure and function, the nervous influence, whether in health or not, which is exerted becomes abnormal, either in kind or degree, the most satisfactory method of restoring it to its healthy condition would be by a dual action at once on the sympathetic and cerebro-spinal nervous systems."

Chapman states his pathology as follows: "That the so-called functional diseases of any viscus are abnormal conditions of the nervous ganglia which control it, and that these diseases are most safely, most easily and most evidently remedied by action not on the viscus itself, not by medicine presumed directly to influence it, but by decreasing or increasing the quantity of blood in those nerve centers by which its blood-vessels are governed."

In practice the patient lies upon the ice-bag for periods varying from one to two or three hours in duration, according to the severity of the condition. It must be borne in mind that this is not a method for the local effect of cold. Cold is not disagreeable, as I have frequently demonstrated upon myself. The application of heat is accomplished by a double-column hot-water bag with an intervening space between the columns, the heat being applied upon either side of the spinal column itself. The temperature of the water should be between 115° and 120° F., and may be applied for the same length of time as the ice-bag. Its greatest range of action lies in functional nervous diseases, and Chapman recommends this for nervous prostration, headache, migraine, insomnia, indigestion, vomiting, constipation, leucorrhea, bronchorrhea, asthma, hay fever, etc. It is claimed by him to be useful in the treatment of neuralgias, especially of the face. I cannot agree with him in the uses and value of this treatment, but it has, in my hands, yielded some results in the treatment of insomnia, in which condition the application of a dorso-lumbar ice-bag has frequently produced drowsiness. This can be increased by the application of the hot-water bag to the "cilio-spinal region"—that is to say, from the fourth cervical to the third or fourth dorsal of the cord. As before stated, these applications have aided me in the production of sleep, but I have never been able to demonstrate their

curative power. They, however, are excellent measures for temporary relief.

Friction.

Friction may be defined as the mechanical act of rubbing the cutaneous surface. It may be performed by the hand, flesh-brush, or flesh-mitten, but the first of these is far preferable to any other form. It is synonymous with the word shampoo as used in medicine. It may be applied by the individual or, preferably, by an attendant. The ordinary manner of its application is to rub the skin surface with the bare hand, preferably in both directions. The condition and sensitiveness of the particular individual in question will decide the depth and pressure used as to whether it will be light or vigorous. Avoid applying such an amount of friction as would irritate the skin or abrade it. Nothing is gained by rough or irritating treatment. This is much more likely to occur where a brush is used than where the hand is interposed. Where the hand or brush has been used too much, superficial redness and irritation are apt to follow. Too vigorous application defeats its own object, and has a tendency to exhaust and tire the patient. See that the hand is perfectly dry. Where it is used simply to assist the circulation, it may be applied only in the direction of the venous blood current—that is, toward the heart. The first influence of friction upon the cutaneous surface is a very pleasant one, its momentary action being to temporarily constrict the capillary circulation, but after it has been kept up for a short time dilatation of the blood-vessels occurs, and it is for this reason that friction favors reaction. The volume of the circulation is considerably accelerated, with a moderate increase of the pulse. Owing to the mechanical action of friction and to the dilatation of both the arterial trunks and capillaries, there is a slight rise in temperature, together with an increased production of heat, a fact that is clinically utilized in the Brand bath, the half bath and the dripping sheet. Winternitz discovered that active friction of the skin, combined with the application of cold water, increases temperature reduction, this being accomplished by bringing a larger quantity of blood to the surface, circulating in contact with cold water. This dilatation of the blood-vessels is very marked in some instances, and can be cultivated by the repeated use of friction.

The influence of friction upon the skin is a valuable one, stimulating it to secrete more actively of perspiration, and particularly of the oily constituents connected with the sebaceous glands. It tends to produce a soft, flexible and smooth skin; it also increases the hairy growth, and care should be exercised in this direction. The therapeutic uses to which friction may be applied form a part of every massage treatment. It is a splendid preparatory procedure to cold water, and



PLATE 8—Friction with Flesh Brush

where one does not have handy the electric light or hot air bath this may be used with the same object in view. It is useful as a preliminary for those cases who are confined to their room, and with whom we would use the dripping sheet or some similar method. To the hydriatist it is the best of all means for the favoring of reaction, and should never be omitted from any method where this is desired. Applied to cold extremities it stimulates circulation. I will have more to say regarding its use when considering the physiological action of the Graul bath in typhoid fever.

Sand Baths.

I have never utilized this method of treatment in my practice, but have incidentally tried and observed its action at the seashore. I do not consider sand nor mud baths to possess any special therapeutic value over ordinary hydriatic methods. They do not, in any sense, compare to the application of radiant heat, such as the electric light bath. Of these baths Winternitz[1] has to say the following:

"Originally sand heated by the sun was employed, but the method has been accelerated in recent years, especially by Dr. Sturm, of Kostritz, and by Grawitz, of Berlin, and its indications have been defined. At present artificially warmed, fine, hard sea or river sand is used, the heating being effected in ovens especially constructed for the purpose. In the tub—a quadrangular wooden box upon rollers—is placed a layer of hot sand from 15 to 30 cm. (six to twelve inches) high, and upon this the patient lies. With the exception of the head, which is elevated, the body is covered with sand, and finally with warm blankets. The floor of the cabinet is generally made of sheet-iron, and is heated by means of tubes placed below. The sand has a temperature of from 42° to 50° C. (113° to 122° F.), and even a temperature of 53° C. (127.4° F.) is well borne. The pulse, it is true, becomes accelerated, as in the case of other methods of overheating the entire body; and also the respiration is quickened, but serious discomfort is exceptional. The head must always be well cooled. Sweating occurs rapidly, and becomes abundant, as the sand exerts a hygroscopic influence, and favors the secretion of sweat. The sand bath is continued from one-half to one and one-half hours."

Salt Rub.

The application of salt to the cutaneous surface has been practiced for years by eminent hydriatists. Medium fine salt is moistened with sufficient water to produce a mushy mixture, after which it is taken in the hand of the attendant and applied to the surface of the body with circular friction movements. Care should be taken to rub gently and slowly so as to prevent scratching or abrasion of the skin, as some individuals are exceedingly sensitive to the scratching influence of this chemical. Persons with a dark, tough cutis may be rubbed vigor-

1 Winternitz, Wm.: "Cohen's System of Physiological Therapeutics," Vol. IX, 1895.

ously until they begin to feel strongly its action upon the integument. The water used to moisten the salt, and the salt itself, should be kept at such a temperature as will avoid chilling of the surface. In sanatoria these applications are made in properly heated treatment rooms, and thus it is not necessary to exercise as much care to prevent chilling. Where the patient is weak he may sit or recline during its application. Considerable amounts of the salt will stick to the skin, and if it is permitted to dry will produce an itchy feeling. Its application may be followed by any hydriatic method suited to the particular case. The patient can then be dried and gently rubbed with the hand to favor reaction. After the application of the salt rub the skin feels smooth and glossy, a great deal like the condition following a Turkish bath, due to the removal of several layers of the epidermis. The physiological action of the salt upon the skin is that of a chemical, thermic and mechanical irritant. Under its use the skin becomes redder and more vascular. Its application alone resembles the salt water bath, and is quite tonic and stimulating. Care must be used with sensitive neurasthenics. It is a valuable introductory method to other hydriatic procedures, and is particularly beneficial in those cases who have dry, harsh and leather-like skins. In some cases of digestive and renal inactivity this measure is an excellent derivative. I have found it to render service in removing localized pains of a neuralgic and rheumatic type when situated in the muscles and joints. I frequently prescribe the incandescent electric light bath with localized applications of salt to painful spots, these measures to be followed by some general hydriatic treatment.

Oil Rub.

From most ancient until the present time oil has been used as a method of treatment after the use of the bath. It will be recalled that one of the divisions of the Roman bath was that of the unctorium, where oils were "rubbed in." It is a constant practice with semi-civilized and barbaric races to use oil after the bath, for protective and cosmetic purposes. The best oil to apply to the surface is a vegetable one, and for this purpose cocoanut and olive oil have proved the best in my hands. Cocoa butter and vaseline may subserve the purpose, especially the former. From an esthetic standpoint the addition of a little oil of rose is not objectionable. Care should be exercised in securing fresh preparations, and seeing that there is not the least degree of rancidity. The best method of application is by means of the palmar surfaces of the fingers and hand. It should be applied to the skin after a thorough cleansing bath. The skin must be dry and free from perspiration. This must not be considered a greasing process, but the oil is to be gently and patiently rubbed into

Plate 38—Salt Rub at Gibe.

the skin. Unguents are not applied to the skin for the purpose of nourishment.

Some of the effects associated with massage are inseparable from the application of the oil rub. Oil rubbing is an exceedingly pleasant and agreeable process where it is gently practiced. Its action upon the skin is to soften and make flexible this organ. It is sedative and is to be recommended for those cases who are so sensitive as to preclude the use of salt or vigorous dry friction. "The natives of Samoa and other south sea islands, who are great swimmers, habitually smear themselves with oil before entering the water. On the other hand, heat radiation by the skin is very considerably increased by the application of oil. Peclet has shown (Schumann) that an oil surface radiates heat 50 per cent. more rapidly than a water surface. The natives of Africa, when exposing their nude bodies to the dry rays of the tropical sun, habitually protect themselves by smearing the skin with melted fat of some sort." (Kellogg.)

Attention may be called to the fact that the Sandwich Islanders, who are probably the greatest swimmers known, not only smear themselves with unguents while in the water, but should one of their members become fatigued utilize friction to overcome this.

The therapeutic application of oils to the surface is narrow and limited. It finds its greatest use in those persons whose skins are harsh and dry because of a lack of sufficient natural oil in the sebaceous glands. Children seem to be more favorably affected by oil rubbing than the adult, though I am rather constrained to believe that it is more particularly the massage or rubbing than the physiological action of the oil. In the vigorous massage of localized conditions it is preferable to use some oil to prevent chafing and irritation. Many writers suggest the use of oil of some kind to the hair after the use of soap. Patients whose reactive capacity is limited gain some benefit from the application of oil rubbing after the bath is over.

The Electric Bath.

The electric bath is only used in the treatment of such morbid conditions as affect the whole system, and provides a convenient though unsatisfactory way of applying electricity. Electrification has a powerful influence upon the body, and is useful in the treatment of general morbid states and in diseases due to impaired, defective nutrition. The temperature of the water should be about 98° F., but it may be slightly warmer or cooler to suit the wishes of the patient; a bath thermometer must always be used to ascertain and regulate the temperature. The bath-tub itself may be porcelain-lined, metal, papier mache or wood, with two electrodes in the form of metal plates at the head and foot. These plates must be kept scrupulously clean and the wires attached by binding posts. The water in the bath offers a

broad conducting medium several times larger than the patient, and therefore a considerable part of the current traversing the water is lost to the patient, this being particularly true of the galvanic bath.

In the use of the galvanic current care must be taken to gradually allow the electricity to enter the tub until the milliamperemeter registers from 100 to 150. Of this Stevenson and Jones[1] calculate that the patient only receives from 18 to 24 milliamperes. The best batteries to use are those of the Leclanche type, and of these I have found the Gonda the best on the market. Forty should be connected with a switch-board having a milliamperemeter, rheostat, pole changer, and binding post. The faradic coil may be added should the physician desire the combined galvano-faradic current.

The patient enters the bath and rests a few minutes to recover from the reaction produced by the action of the warm water before the current is turned on. Gradually and slowly increase the current, watching the meter until the proper dosage is reached. It is best for a medical man to be present when the galvanic current is used, although a well-trained nurse will usually be able to conduct the séance; if it is necessary for a medical man to be present in the case of ladies a bathing costume should be worn. I formerly used the electric bath considerably, and at that time had it so arranged that the battery and switch-board were in an adjoining room; a speaking-tube was carried to the bath-room and the current was, in this way, regulated. It is, however, best for the physician to be present and in the room while the galvanic current is flowing.

A wet turban or ice helmet should be placed upon the head and care exercised not to take the bath too soon after a full meal. The action of the electric currents is to redden the nape of the neck, which gradually passes off after a short while. The alternating current or induction coil may be used, the alternating current producing a smoother sensation, the rise and fall of the individual impulses being less abrupt than with the coil. The induction coil current throws the abdominal muscles into action more readily than the galvanic current, and generally produces more muscular contraction. No one should attempt the giving of an electric bath from the "mains" unless he be what very few medical men are—an expert electrician. The sinusoidal current may be used in like manner.

The therapeutic uses of the electric bath are those of a general tonic, and it finds its uses mostly in states of debility. Some have found it of value in alleviating the distress connected with the discontinuance of morphine. Many have lauded this bath as a means of increasing appetite, digestion and assimilation, and have obtained results far different from my own experience. After several years' experience with this bath I have discontinued it as one of my thera-

[1] Stevenson and Jones, "Medical Electricity," 1891, p. 348.

peutic weapons. It is described here in order that the work may be complete, and not from any desire to laud the method, which I consider of little or no value. If electrization is what is aimed at, there are so many more special methods, general and local, of obtaining results in this line that I heartily condemn the hydro-electric method. It has been the bath *par excellence* of the quack heretofore, and while it has been removed from that particular domain by the scientific researches of both Hydel[3] and Hedley,[4] still hydriatists in this country who have other methods that they may use rarely, if ever, turn to the electric bath.

Steam.

Steam and the vapor from boiling water have been used for years by the physician and laity for the purpose of inhalation. This is, in reality, not steam inhalation, but is the inhalation of air saturated with moisture and warmed by the admixture of steam. It can be produced from the so-called croup kettle, but also obtained as steam in those houses that are provided with steam heaters. As a rule, heat is inhaled for a short time, at certain periods during the twenty-four hours, and there is no question but what this agent has given great comfort and alleviated the suffering of hundreds of persons affected with acute and chronic conditions of the air-passages. The action of steam upon the air-passages is that of localized heat, heretofore described and needless to be repeated again. In catarrhal conditions of the nose and throat it finds its most useful application. Relief from inflammatory conditions of the throat may be obtained by the inhalation of air passed through an ordinary inhaling bottle, the hot water of which is saturated with compound tincture of benzoin. One of the great objections to its use is the necessity of its frequent repetition. The ordinary duration of an inhalation should be about ten minutes. Its action is decidedly soothing and relaxing; it aids and improves the circulation in the part to which it is applied. I have never seen any permanent benefit derived from its application to chronically inflamed tissues of the upper air-passages.

Another method of treatment consists in the inhalation of steam from a receptacle to which it is conducted, and of such shape that the entire head may be exposed. Around the head a towel is thrown, the steam inhaled thus being brought simultaneously in contact with the skin of the face and the mucous membrane of the air-passages. The stimulating influence of heat internally is reinforced by the active vascular dilatation that takes place within the skin surface thus exposed, draining the collateral circulation. Relief is frequently experienced in a few moments. After the administration care should

3 Hydel, L., "The Electrische Bader," 1896.

4 Hedley: "Hydro-Electric Methods in Medicine," 1892.

be taken to avoid the inhalation of cooled or cold air. The external application of cold water to the face and neck following such a method of treatment will decidedly prolong and enhance the blood vascular effects obtained.

It is the custom with writers upon hydrotherapy to include within the domain of such a work a description of lavage, enteroclysis, vaginal and vesical irrigation. I have frequently felt that while these were truly hydrotherapeutic applications, still it did not seem to me as though they belong to the true domain of works of this kind, but rather are methods of therapeutics limited to particular specialties. The author therefore refrains from describing these procedures, and refers the reader to works upon diseases of the stomach and intestines, surgery and gynecology, wherein will be found proper descriptions of the technique and the aims and objects to be accomplished.

CHAPTER VII.

RULES, REGULATIONS AND PRACTICAL SUGGESTIONS.

Even with a mastery of the principles, a thorough acquaintance with the technique and apparatus, there still remain certain practical suggestions that are the result of long experience and the handling of many cases and classes of disease. For this reason it has seemed proper to me that they should be laid before any one contemplating the use of hydrotherapy as a method of treatment.

Probably the most important principle in the guidance of hydriatic treatment is to treat the patient in hand, the *condition* and *not* the disease with which he has been tagged. Given a number of patients suffering from the same disease, and we will, if we intelligently study each individual, change and modify the treatment to meet the particular necessity of each case. Furthermore, it should be constantly kept in mind—and that clearly, too—that there is resident in the patient's body a vital force, the *vis medicatrix naturæ*, which, if it can be called into play, will cure.

It is a condition precedent to success, before commencing a course of hydrotherapy, that the physician should be in possession of *all* facts regarding his patient. By this I do not mean a haphazard and loosely conducted examination, but a full clinical history, a thorough examination of heart, lungs, and especially the *peripheral blood-vessels*, supplemented by an analysis of the blood, urine, and, where necessary, the gastric juice, blood-pressure tests, etc. In considering the clinical history of a case due weight must be given to the nervous system, studying the vasomotor indications and needs. It is by just such careful and painstaking examinations that we avoid the unpleasant effects of hydrotherapeutic applications. I recall with pleasure that in an experience covering eighteen years I have had few disagreeable results follow an application of this remedy, and believe that this has been the case simply because the rules here laid down have been followed.

The physician is the only person by whom the treatment is to be mapped out in all its details and technique, though the hearty and intelligent co-operation on the part of the trained nurse and attendant will materially aid in securing results. In a nurse implicit obedience is an excellent trait of character, and implicit obedience, tempered with a little judgment, aids in securing results. Nurses in the hydriatic department of sanatoria soon learn how to handle patients who come

into their hands, and are able to note degrees and differences of reaction that are valuable to the changing of hydriatic prescriptions. Every nurse to whom these cases are entrusted should know thoroughly the changes that constitute reaction.

Should the detailed examination show the patient suffering from some form of organic trouble, especially some structural disease of the kidney (Bright's disease), care must be exercised to arrange the hydriatic prescription with regard to the application of cold water. The timid neurasthenic and hysteric must, by patience, assurance and reassurance, be convinced of the advantages that accrue from this treatment. These patients are, as a rule, deficient in will power and capacity, and are apt to form aversions to certain kinds of treatment, even when carefully graduated to their needs. The thin and the fat need different methods, and their physical states should be taken into consideration in our prescription. The physically weak and exhausted should receive careful attention, as they have less muscular tissue for the generation of heat, and are, as a rule, anemic and toxic.

In the management of those chronically invalided, who have run the gamut of medicinal therapeutics, whose systems are more or less saturated, so to speak, with medicines, time becomes an element of necessity in their treatment. Too frequently I am consulted and asked if a few weeks' course of treatment can overcome long-standing ailments. The system has become warped, pernicious habits and conditions of life formed, which not only have to be changed, but a sufficient length of time allowed to establish physiological reactions and rhythms, and this cannot be changed and adjusted in a few weeks' time. It is often a question of months.

Of all the classes of patients that seek the hydriatist's aid, the most difficult to handle and those in whom more caution has to be exercised, is the class suffering from the symptom-complex called neurasthenia. They are sick all over, nervous, impressionable, irritable, dyspeptic, toxic, with skins that are strangers to cold water. Caution must be exercised in the inception of any method.

The hydriatist should pay particular attention to arterial sclerosis when placing his patients upon treatment. Age is not measured by years, but by cardio-vascular conditions, some persons being older at thirty than others at sixty. Especial care in cases of this kind should be insisted upon, as there is serious danger of the rupture of a brittle or weakened blood-vessel, and as these vessels are usually more commonly present in the brain, the danger of a cerebral apoplexy should not be overlooked.

For esthetic reasons alone hydriatists, as a rule, forego the use of baths during the menstrual period. There exists in the minds of the laity a conviction that is firm and immovable that baths should

be discontinued or forbidden during this period. This is not limited alone to the ignorant and uneducated, but is prevalent among well-read and enlightened members of the community. Physiology furnishes no basis upon which to form such an hypothesis, and physicians are largely to blame for having nurtured this belief, which is due to ignorance of natural laws. I have read, though I am unable to put my hand upon the authority, that upon the Massachusetts coast is a colony of sturdy fisher people whose women enter the sea during the menstrual period, even during the dead of winter, without the slightest ill effects. While this extreme is not applicable to the delicate and hot-house nurtured individual of the present generation, still it is true that they can be readily trained to endure without discomfort and with much benefit the application of cold baths at this time. As an actual fact, water stimulates intrapelvic circulation, and thus corrects and counteracts irregular and deficient menstruation. The time-worn and hoary legend that the contact of cold water to the skin during the menstrual period will cause cessation of the flow, is a relic of bygone days, and a reminder of the infancy of this treatment, before the principles and physiology of the action and reaction of cold water were studied or appreciated.

Hydriatic treatment should not, as a rule, be administered immediately after a meal, but a period of at least one hour or one hour and a half be allowed to intervene. As before stated, I have found the best period for administration of these methods of treatment to be during the forenoon, preferably two hours after breakfast and up to within a half or one hour of lunch or dinner.

Metabolism should be carefully studied and the patient's weight watched, whether the aim is constructive or destructive. Much information as to the general internal changes that take place may be gained from the feelings of the patient. An improvement in appetite, muscular strength, and that feeling described by our Gallic neighbors as *bien faisance*, constitute an excellent index. The solid constituents of the urine often give valuable aid, an excess of solids, especially the chlorides, indicating increased tissue breakdown, while an excess in urea points to destructive metabolism taking place in the muscles, demanding a regulation of exercise and hydriatics.

Extreme exhaustion contraindicates the use of cold applications. In these cases fatigue, chilliness, blueness of the extremities and cold sweat may be present. Under such conditions it should be our aim to bring about reaction by the application of heat and heating procedures, and when this is fully established a brief *stimulating* and tonic application of cold can be made to ensure permanency.

Organic diseases are, of course, from their very nature, incurable, but there are comparatively few organic diseases, excepting in the latest stages, that have totally destroyed the function of any organ or part.

It has been my observation that the judicious, proper and painstaking application of suitable hydrotherapeutic applications prevent degeneration and check further encroachment. It frequently occurs that if the remaining tissues are undisturbed by the process they will take up the work, and thus a part may be made to perform the work of the whole. It is common sense as well as sound logic, that whatever increases vital force, improves vigor and resistance, is certainly going to be a bar to further deterioration and incapacity.

It may be noted again that reaction is that appearance of bright red color, an agreeable glow and sense of well-being that follows the application of cold. All nurses follow cold-water treatment by moderate friction to hasten reaction.

In order to avoid disagreeable and ill effects of cold applications to the general surface, it is always well to carefully train the patient's reactive powers, collecting heat upon the surface and making the first cold application at a moderate temperature, say 80° F., reducing the temperature two or three degrees or more daily, as reactive capacity develops. Never use strong measures at the start, but gradually work up from the milder to the stronger, from higher to lower temperatures, for by so doing much of the difficulties experienced by patients in these treatments can be avoided. As the patient reacts to each successive reduction of temperature, he soon becomes able to stand a temperature that would have been impossible and attended with danger had it been utilized at the start. The aim of tonic hydrotherapy is cold, and very cold, temperatures (65° to 45° F.), for it is from these temperatures that the most satisfactory and favorable effects are obtained. Reaction in nervously exhausted cases is best attained by brief, stimulating, cold applications.

Preliminary or preparatory treatment for cold temperatures is important, and must be carefully studied by the hydriatist. The electric light bath, hot-air cabinet, vapor cabinet, salt rub, friction or physical activity sufficient to produce slight perspiration, favor prompt and tonic response and the onset of reaction.

Imperfect reaction is a disagreeable phenomenon that can attend the application of cold. This is, in the highest degree, an injury, and indicates failure to attain our object. The nurse first applies vigorous friction, assisted by the patient, for muscular exercise favors reaction; should this fail, the patient must be wrapped in blankets, hot-water bags placed to the feet, and very hot water sipped slowly. By this means imperfect reaction will be overcome. Where reaction takes place and it is not sufficient, it can be increased by moderate exercise after the bath. The disagreeable after-effects of cold applications are, generally, fatigue, muscular aching, lassitude, headache, depression, palpitation of the heart, irritability, and an increase in localized painful conditions.

Habit is the result largely of neural responses to certain impressions. Patients who have never formed the habit of using anything but hot water have missed the pleasurable portion of bathing, and these individuals must be trained to stand colder temperatures; whereas, those who have been accustomed to the use of cold water may frequently be at once subjected to radical treatment, for in these the neural and vasomotor mechanisms are habituated and trained to those prompt responses that are the essential and basic part of reaction.

The best time of day for the administration of hydriatics is, in my opinion, between the hours of 9 A.M. and 3 P.M. Certain procedures are best given before breakfast, others at bedtime, but, taking the vast bulk of tonic treatments, we may say that the above hours are the best. In the treatment-rooms located in large cities it is not an uncommon thing to give treatment in the evening, and, while this practice is objectionable, it is better than no treatment at all, but it is certainly second or third best.

Care and attention should be given to the temperature of the treatment-rooms. The bath-room must be kept warm, and, in my opinion, 80° F. even is not too hot. By this means the comfort of the patient is conserved and the warm temperature favors reaction. After the patient has been thoroughly dried, he should return to the rest- or dressing-rooms, which are kept at a much more hygienic temperature.

It may be set down as axiomatic that the colder the water the shorter the duration; the colder the application the more vigorous should be the percussion. Where this is borne in mind, excellent results are obtained. For very cold applications (34° to 55° F.) the duration should not be over three to five seconds, applied under considerable pressure; where the temperature is cold (55° to 65° F.) the duration may be extended to a maximum of twenty seconds; while for cool applications (65° to 80° F.) they may last as long as one-half to three-quarters of a minute. If temperature-reducing effects are aimed at, however, this rule will not hold good, but the application must be kept up for fifteen to twenty minutes and be attended with friction. In the administration of neutral methods in order to obtain sedation it is necessary that the application should be from twenty to sixty minutes. Under some circumstances these applications have been continued for days and weeks, notably in the series of cases published by Reiss. As before stated, the aim of neutral applications is the avoidance of thermic reaction.

What is true of cool, cold, and very cold applications is also true of warm (96° to 98° F.), hot (98° to 104° F.) and very hot (104° F. and above) applications—that is to say, very hot applications should be of short duration, rarely exceeding half a minute, while the hot and warm applications may be correspondingly prolonged.

Just as white looks whiter upon a black background, so we may

obtain more stimulating and revulsive effects if we alternate temperatures, and this is particularly true when alternation is accompanied with considerable pressure. Where stimulation of this kind is desired, and it is deemed expedient to make the application, heat should always be the temperature first applied. It can usually be borne from 104° to 120° F., lasting from fifteen to thirty seconds, and followed by a very cold application (55° to 40° F.) for three to five seconds, again the hot application, then the cold. By this means we obtain very powerful reactions. My personal experience has been that there is no method so capable of relieving deep-seated pain, especially of fibrous tissues and peripheral nerves. Applied in this manner to the spine, it is astonishing what a multitude of activities are reflexly aroused, and what far-reaching and satisfactory conditions are produced. Stiffness and ankylosis are very effectively overcome, provided they fall within the curable category.

When the dripping-sheet and non-percutient methods are used, the patient must stand in a foot-tub of water, as hot as can possibly be borne. This does away with shock, is a comfort, and, while a small detail, will frequently overcome strenuous objection and reluctance. It favors reaction.

Patients frequently experience a sense of constriction and weight upon the chest, together with an apparent "shutting-off of the wind," when first subjected to a cold application. In hunting for an explanation of this, I noticed it was their habit to keep the mouth tightly closed, breathing only through the nostrils. This can be easily overcome by merely opening the mouth wide and inhaling deeply when the cold water strikes the surface.

Many cases have positive harm done them by courses of treatment administered at popular pleasure resorts or mineral springs. These springs are usually hot salines, and the patient is immersed in the hot full bath for periods ranging from ten to thirty minutes. As a result, sedation and weakness, together with a considerable breakdown of tissue, take place, and harm is done to the bather. This is likewise true of those who resort too frequently to the Turkish or Russian bath.

Mere age does not preclude the use of hydrotherapy as a remedial agent, but does determine in a certain way the kind of treatment, its temperature, duration and force of impact. This is equally true with regard to the young, and in this, as in a number of other things in life, extremes meet, and the same rule applies for the child, the infirm and the elderly. The aged and the young cannot stand extremes of temperature, and are slow to react at all times. Care should be exercised to examine the heart from time to time. Children under seven years of age do not well bear the application of very cold water, and the douche in all forms should be avoided.

The daily cold bath is an important aid to general development in growing children, and increases muscular vigor, energy and nerve tone. It prevents the development of neuroses in young persons just entering upon puberty, relieves so-called growing pains, and promotes vigorous and normal development.

We are frequently told by patients that an application of cold to the cutaneous surface results in a slight attack of rheumatism or a "fresh cold." These pains are not, as is commonly supposed, due to the shock of the cold water or to catching cold, but are more often the result of the setting free of uric acid and toxins of the uro-toxic group. These are absorbed into the circulation, produce irritating effects, dull aching pains and stiffness. It has been my habit for a number of years to be careful to see that patients are dried with especial thoroughness before leaving the bath-room during the winter months. They should exercise sufficient care to see that the skin is not damp before exposing themselves, for the colder and drier air of winter is very apt to cause rapid evaporation of the surface moisture, giving rise to chilliness and being followed by the so-called "cold."

Hydrotherapy offers to those in health an excellent and effective method for the maintenance of sound and physiological function. The average human has a pure inherent objection to the use of cold water, and for this reason is apt to employ neutral, tepid or hot baths solely for the purpose of cleanliness, thus missing a great deal of the hygienic and tonic properties of the bath. Cold water is a tonic to both the central nervous and sympathetic systems. Cold bathing develops a flexibility of the vasomotor system and a vital resistance in the skin. I know of no better way of *preventing* or *overcoming* the tendency to "catch cold" than the cold bath. This is not brought about by "closing up the pores" of the skin, but is due to an increase in vital resistance, to greater flexibility of circulation in the skin, and the ability of the vasomotor mechanism to respond to cold impressions and reheat the skin.

It is an interesting fact that I have observed time and time again, that patients frequently have their condition very much aggravated during the first few weeks of treatment, a state trying to them, and a period during which the physician is subjected to somewhat of a strain in maintaining his authority and retaining their confidence. This is especially true of those who are sick all over, whose every functon is involved, and who have little, if any, vitality as a margin upon which to build. This includes the neurasthenic, the dyspeptic, lithemic, the so-called "chronic invalid"—in fact, the flotsam and jetsam of therapeutics. At first the problem seems peculiar, and to the patient distressing. It is probably due to the fact that the treatment has thrown toxic material into the blood in excess. It is a good plan, therefore, to warn patients before they start that they may

experience an intensification of their symptoms, but that these will disappear with perseverance in the treatment. Haig explains this condition on the hypothesis of the presence in the blood of an excess of uric acid (uro-toxic group), and that the increased symptoms will disappear with the elimination of these toxins. This is doubtless, in part, true.

The ideal progress toward recovery is the gradual and steady cessation of symptoms and betterment of condition. *This is rarely obtained.* There are three modes of recovery under the application of these methods. The first is a steady, unbroken and satisfactory progress; the second a zigzag, irregular course; and the third in which there is a sudden improvement after a prolonged perseverance in the treatment. These last cases obtain results by a sturdy confidence in their physician, a courage born of belief in his capacity. Not only is it necessary for the patient to persevere sufficiently long to secure results, but it is essential that the treatment be maintained some time after recovery. It is not sufficient to simply secure an amelioration or disappearance of symptoms. This lack of care on the part of the sick to secure permanent results explains many of the relapses recorded against certain methods of treatment.

Patients who have been chronic invalids for a long time have formed pernicious functional habits, and after recovery are more liable to the action of the causes that before produced the disease. For this reason they should exercise every hygienic precaution, and among the preventive methods is the use of cold water as a part of the patient's daily life. By so doing he is able to guard himself against the action of these causes.

Cases frequently do not receive the maximum benefit while they are under the immediate care of the hydriatist. There may be an amelioration and betterment of the symptoms, but a cure does not take place until after the patient returns to home surroundings. Thus, oftentimes, hydrotherapy is not given its full meed of praise for the excellent work it has accomplished.

The majority of people in health, and especially those who are sick, have to be coaxed to take a bath—that is to say, to use cold water. Cold water usually means tepid, and very few of their own volition use a temperature under 80° F. These cases can be made to respond to the lowest temperatures.

Sedentary persons especially need the benefit of the cold bath. Such persons may advantageously employ, before the cold douche, a hot bath of three or four minutes' duration. Adults who are predisposed to rheumatism, gout, gravel, migraine, Bright's disease, neurasthenia, and other maladies which for the most part are the result of the retention within the body of the products of nitrogenous waste, are benefited by the employment of the cold daily bath. Cold-water

treatment is especially useful for women of civilized nations, because of the deteriorating influence of their artificial life. The harmful customs of civilization, rather than nature, have made woman "the weaker vessel." The cold bath gives nerve tone, combats nervous weakness, is a most excellent prophylactic against hysteria, and to a very considerable degree overcomes the unwholesome tendencies of the in-door and sedentary life to which most women are subjected. The cold bath favors the development of the menstrual function in young girls, and, if habitually employed, normalizes the menopause.

There are certain groups of patients whose skins are, hydrotherapeutically speaking, foreign to water, not that they are unclean. These people are benefited by all sweat-producing methods when sufficiently prolonged. The heat and sweating soften and loosen the dead and horny superficial layers, which are easily removed by the subsequent hydrotherapeutic application and mechanical friction. As a result, the openings or mouths of the various excretory ducts opening upon the skin are freed from their superficial coverings, and the accumulated waste material—fat, dirt and dried perspiration—removed. Opportunity is given for elimination, which these cases need so badly.

Persons whose sedentary occupations confine them largely within doors, who work a great deal by artificial light, can maintain health, tone and vigor by the use of a sweating procedure and hydrotherapy twice weekly. I know of no more pernicious and dangerous method of following the above suggestion than the use of the so-called "home vapor cabinet." The trouble does not lie in the cabinet or in the method, but the individual using it is unwilling to follow the sweating by a cold application of sufficient length to remove from the skin the increased heat imparted. For this reason there is no vigorous thermic and circulatory reaction, the real, essential object aimed at in the bath. In cold applications we have a means by which oil may be applied to the wheels of human health and the machinery made to run smoothly.

One of the most valuable and interesting of all the actions of water in therapeutics is the influence it exerts upon the circulation, with the resultant reaction. Where the effect is general it is more or less valve-like in action, drawing a large quantity of blood to the cutaneous surface from the interior of the body, especially the viscera. Nearly all disease starts in a disordered circulation, and he who has control of any means by which he can influence its action has a valuable weapon with which to combat and cure diseased and disordered states, for chronicity is oftentimes maintained by circulatory disturbances or by the states produced in the body dependent upon these disturbances. Stasis of the circulation forms a favorable nidus or point for infection or the development of metabolic conditions favor-

able to disease, while, on the contrary, the favoring of a rapid circulation and the passage of a larger quantity of blood through any particular organ stimulates its function and regeneration.

In the anemic, care should be exercised to precede all hydriatic treatment by some heating procedure. In my hands the electric light bath has yielded the best results, the patient being kept in this long enough to heat the skin thoroughly, or until perspiration is barely perceptible to the touch. Better results will be obtained if the full strength of the bath is used for a short period.

Acute inflammatory conditions, as a rule, contraindicate the use of stimulating or percutient measures; chronic inflammatory conditions, notably those of neuralgia, myalgia, chronic rheumatism and chronic neuritis (especially of the sciatic nerve), require strong and vigorous ones to bring about the desired result.

Secondary sedation of the nervous system is nearly always obtained through the influence of hydrotherapy, but where direct sedative action is desired this is best obtained by the use of the neutral bath continued for periods ranging from thirty to sixty and even ninety minutes. The aim in this bath is to avoid all the stimulating influences that take place with reaction. Care should be exercised not to employ friction after the bath; dry the patient as rapidly and as gently as possible. Secure dryness, if possible; if perspiration takes place, evaporation causes chilliness, and the effect of the bath is defeated. The evil effects of the neutral bath are chilliness, exhaustion, headache, nervousness and irritability. I cannot speak with the enthusiasm of some writers upon the benefit of the neutral bath for the relief of insomnia. It has given some good results, but usually the patient has been one who possesses very strong and active circulation.

Among sedative procedures, especially for the relief of insomnia, may be recommended the cold full wet pack at a temperature ranging from 75° to 65° F., it having proven, in my hands, the most satisfactory method.

There is a popular superstition that organic heart disease absolutely precludes the utilization of hydrotherapy. This is very far from the truth, as I have demonstrated too frequently in my practice. Care must be exercised, however, to most cautiously and carefully train the patient to stand hydriatic procedures, very mild in their nature at first, but gradually changed and adapted to the improvement that takes place. It is my rule to never give these cases very low temperatures nor very great pressure stimulation, and to sedulously avoid the application of even moderately cold percutient measures to the chest and abdomen. As will be seen, by means of the Schott method of baths and exercise, organic heart disease may be cured. In functionally irritable and weak hearts it is my policy to follow

practically the same method of training, but the time required to tone and strengthen cardiac activity is naturally very much shorter than in cases of organic trouble.

Speaking in general terms, chronic diseases of the skin present certain obstacles to treatment by means of water. If suppurating boils, pimples or acute eczema are present, it has been my experience that heating procedures, followed by neutral or tepid applications, give the best results. Where these conditions are localized or circumscribed, we should proceed with the treatment as though they did not exist. Where it is important to prevent the water reaching the circumscribed condition, the covering of the parts with oil silk and a bandage permits us to utilize all the advantages of hydrotherapy without injury to the localized eruption. Acute eruptions of the uric-acid or auto-toxic type are benefited by hydrotherapeutic applications. Localized irritations, pimples, small boils, etc., frequently appear under compresses; this can be prevented by keeping the compress clean; nothing equals simple boiling.

It should be the aim of the hydriatist while prescribing for his patients to inculcate proper hygienic laws, and at the same time to insist upon the copious or free drinking of plain water where indicated. In like manner it is needless to state that it is an excellent time and hour for the cessation of stimulants, narcotics and their like.

In conclusion, bear in mind the fact that Baron Liebig, fifty years ago, observed that "cold air, cold water and exercise, habitually employed, are the most powerful of all means of stimulating tissue activity." For the sake of condensation and ready reference the following table is appended:

Bath.	Temperature, Degrees F.	Average Temperature.	Duration of Bath.
1. Sponge bath	50-70	60	No fixed time.
2. Cold compress	34-50	40	Until warmed.
3. Cooling compress	60-70	60	Until warmed.
4. Stimulating compress	50-70	60	Until dry.
5. Hot compress	110-130	120	Until cooled.
6. Dripping sheet	50-70	60	3 to 5 minutes.
7. Hot fomentation	120-160	140	No fixed time.
8. Dry full pack	Warm	—	Until sweating.
9. Hot wet pack	120-130	125	½ to 1 hour.
10. Cold wet pack	40-70	60	½ to 1 hour.
11. Affusion	50-70	60	½ to 1 minute.
12. Hot foot bath	105-120	110	5 to 30 minutes.
13. Cold foot bath	50-60	55	1 to 5 minutes.
14. Hot sitz bath	105-120	110	5 to 20 minutes.
15. Cold sitz bath	50-80	60	5 to 15 minutes.
16. Half bath	50-80	65	2 to 5 minutes.
17. Cold plunge	50-70	60	Instantaneous.
18. Hot full bath	100-115	104	2 to 10 minutes.

Bath	Temperature, Degrees F.	Average Temperature.	Duration of Bath.
19. Cold full bath	50-70	60	5 to 10 minutes.
20. Warm full bath	96-100	98	5 to 30 minutes.
21. Neutral full bath	94-96	95	20 to 60 minutes.
22. Brand bath	60-70	65	10 to 15 minutes.
23. Hot rain bath	104-120	105	½ to 1 minute.
24. Cold rain bath	50-70	60	5 to 20 seconds.
25. Hot fan douche	104-120	115	½ to 1 minute.
26. Cold fan douche	50-70	60	10 to 20 seconds.
27. Hot jet douche	104-120	115	½ to 1 minute.
28. Cold jet douche	50-70	60	10 to 20 seconds.
29. Hot air bath	110-190	160	5 to 20 minutes.
30. Body superheated dry hot air treatment	200-400	275	20 to 60 minutes.
31. Local hot air bath	200-400	300	20 to 60 minutes.
32. Turkish bath	150-200	180	10 to 20 minutes.
33. Russian bath	110-130	120	10 to 15 minutes.

CHAPTER VIII.

EQUIPMENT OF HYDROTHERAPEUTIC INSTITUTIONS AND SANATORIA.

The acme of hydrotherapeutic accuracy, the best and most permanent results in chronic diseases, are obtained from treatment in institutions and sanatoria, where every facility is at hand for the refinement of technique. I have obtained results with a few sheets, pails of water and mediocre intelligence in a way that bespeaks highly the effects of water, even under most disadvantageous conditions, when used in acute diseases and acute manifestations of chronic troubles. The most efficient method is the douche, in its various forms and modifications, because of its powerful thermic and percutient effects. This procedure is preferred in sanatoria and institutions more than any other method, because of its efficiency and the shorter time required for treatment. The general practitioner of medicine should not, however, be deterred from using hydriatic procedures in acute febrile and other manifestations of disease, for in this field some most startling and remarkable results are obtained. It is the chronic cases, those who are sick all over, whose nutrition is bad, who need the general control that sanatoria exercise, that the practitioner should send away, for in these cases it is necessary that the patient should give himself up entirely to health-getting in order that he may secure good results.

Hydrotherapeutic apparatus is, of necessity, bulky and expensive, and its erection and use entail a cost by no means inconsiderable. The arrangement and plan of such an institution will depend largely upon the character of the building to be used for the purpose. The best place to locate the rooms is in the basement; in case of a leak no injury would result to contents located upon lower floors. For the sake of clearness, two drawings are herewith appended; one where a large oblong, the other where a narrow and long space is to be used. This latter arrangement is particularly applicable to large cities, where the houses are more or less narrow and the buildings of some length.

Before arranging his institution the hydriatist should satisfy himself on several points in order to insure the successful use of the apparatus he proposes to install. An abundant supply of water is necessary. It goes without saying that the water to be preferred should be soft and contain as little mineral as possible. Clear water, from esthetic and other standpoints, should be used, although this cannot

always be obtained. *Mineral waters offer absolutely no advantage whatsoever in the practical applications of hydrotherapy.* The next essential is sufficient volume and pressure within the building. Without sufficient pressure the various forms of the douche will fail of their effect and disappointment result. I am constrained to believe that thirty—better still, forty—pounds should be the minimum. In my sanatorium I have a pressure of 100 to 125 pounds, and at times need this full pressure. In order to obtain sufficient volume and pressure, the main supply pipe should, in my opinion, be of a minimum diameter of four inches from main to boiler or heating apparatus; from this point to the douche apparatus the pipe should be of a diameter not less than two inches, and the douche apparatus pipes of not less than one inch in diameter. These dimensions are, as a rule, difficult to obtain from water companies unless intelligent explanation is made of the essential need of such a supply for treatment. Attention should be given to the question of ventilation and heating. Where the institution is located in the basement, ample windows with areas permit of a free circulation of air in summer and a proper ventilation in winter. This will also give light, although in the majority of instances light will, even in the day time, be obtained by artificial means. Care must be exercised to avoid draughts, and to this end those rooms in which the temperature is raised should be provided with spring doors completely closing the openings. I am of the opinion that the *douche-room and other treatment-rooms* should have a temperature of from 75° to 80° F.

One of the essential necessities of such an institution is an unlimited supply of hot water during all the months of the year, and of cold water during the summer months, to secure temperatures between 50° and 60° F. In summer time water from a deep well is of a sufficiently cold temperature for all practical purposes.

This brings us to practical consideration of the floor plan of such an institution. By referring to the diagram the writer believes the reader will find there incorporated certain features that are of decided advantage. Note should be taken of the fact that the floor plan calls for two separate halls, an outer and an inner one. It is obvious from this plan that the servants whose duty it is to attend to the boiler for heating the water can enter the boiler room without coming in contact with those who are taking treatment. The various treatment-rooms open upon the inner hall, and are provided with doors that completely close the opening. I deem it of importance that the cooling- or rest-room should be at the extreme end of the floor plan. This room should be moderately lighted, and furnished with a number of cots, or, better, couches, upon which patients may recline. Experience has taught me that a leather couch, properly protected, is the best for this purpose. Adjoining the rest-room is the dressing-



PLATE 40—Author's Plan.

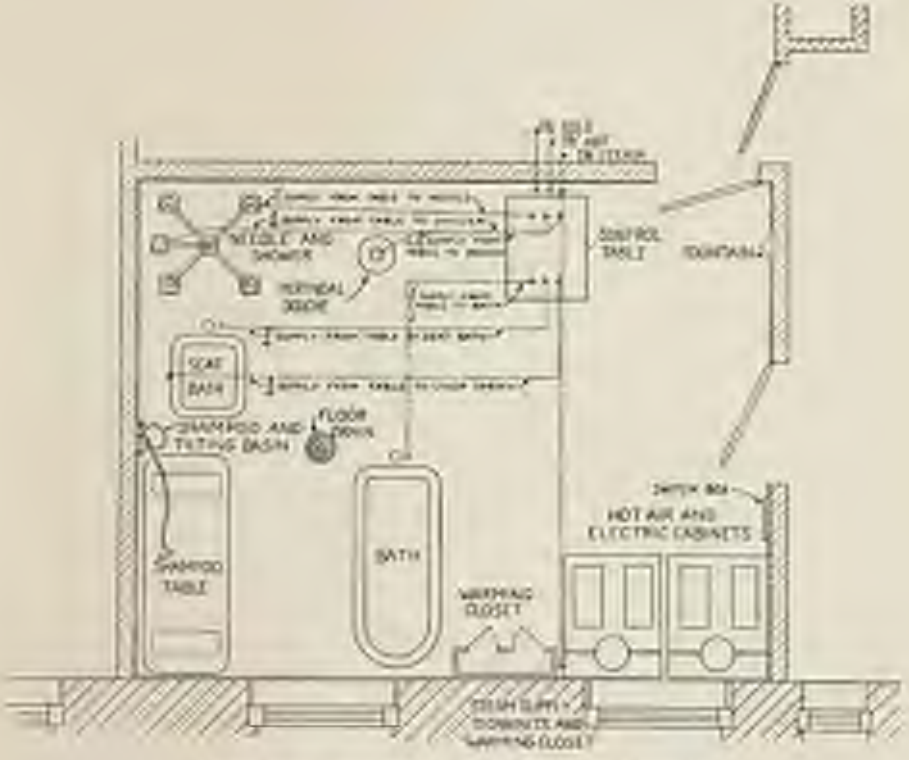


Plate 8b—Diagram of Hydriatic Room (Moll)

room. This room should, in my opinion be painted a white color, and the individual dressing-rooms or stalls furnished with permanent latticed swinging doors. The lower edge of the partitions is about nine inches from the floor, and rest upon nickel-plated brass holders. Each room is furnished with from eight to ten porcelain hooks upon which clothing may be hung; also a chair for the patient's comfort. It is hardly necessary to state that the reason for the raising of the partition nine inches from the floor and the painting of the room a white color is to give more and better light in each compartment. Adjoining the dressing-room is the general treatment-room, which should be furnished in marble, and in which there should be hot air, superheated hot air, vapor and incandescent electric light baths. The author's experience has been so favorable with the incandescent light bath that he has almost entirely dispensed with the use of the ordinary hot-air cabinet in this room. We would also have an incandescent electric light cabinet, a special arc cabinet bath and a body and joint apparatus for the application of superheated hot air. For the construction and arrangement of these cabinets the reader is referred to the previous chapter, in which they have been fully dealt with. It will be noticed that from this room a door opens into the "douche-room." This room must be especially constructed. In my sanatorium there are brick walls on each side laid in cement and covered with white porcelain tile closely and carefully laid on. The floor is laid in rough concrete and abruptly drained to the center. The room is twelve feet broad by twenty feet long in the clear. Along one wall is to be found a foot and two sitz bath-tubs, mounted on marble platforms. These tubs are so arranged that the water from them drains upon a concrete floor, and not over the marble base. Adjoining these is a large porcelain bath-tub, seven feet long, placed upon the concrete floor. On the rear wall a shower, triangle and circular rain-bath are located. The room is equipped with the author's wall apparatus and Baruch's douche table. This wall apparatus and table are connected with the circular rain, triangle, fan, jet and other douches. It is impractical to operate the foot, sitz and full bath from the douche table, so the author has discontinued this method and supplied each of these with a separate hot and cold water supply, using one-inch brass nickel-plated piping and large one-inch faucets for the purpose. As this apparatus and the method of its employment will be fully described in a later chapter, no comment will be here made. The rear room should be supplied with several tables or couches for packs, fomentations, compresses and enemas. At the end of the hall a toilet-room is provided.

All of the rooms are furnished with concrete floors. In the cooling or rest-room a rug should be spread between the couches. The writer has, after numerous trials, found that the ordinary rubber

carpet is by far the most satisfactory covering for the floor. It does not become cold in winter nor hot in summer, and with the moisture present rarely, if ever, rots. The concrete floor of all the rooms, except the douche-room, should be of the smoothest kind. The douche-room is furnished with a slatted floor so arranged as to be perfectly level. This requires the sleeper upon which the slats rest to be beveled so as to fit the sloping floor of this room. The slatted floor should be constructed in five or six sections, so arranged as to enable them to be easily lifted for the purpose of cleansing the floor beneath. They should be made to fit snugly around the douche table, the marble base of the foot and full bath-tub, triangle and circular rain bath. The timber used must be the *very best of kiln-dried cedar*, put together with *brass* screws, free from all knots, and the edges of the slats *rounded* with a plane. The entrance from the general treatment-room to the douche-room should either be on a level with the top of the slatted floor or furnished with a slanting entrance to prevent patients stumping their toes. The entire place must be lighted by overhead electric lights, manipulated by easily accessible switches.

The rapid résumé of a patient's treatment would be the entrance from the outer hall into the inner hall and dressing-room, where, after disrobing, with a sheet thrown around him, he enters, at the request of the attendant, the general treatment-room, receives a preliminary aplication of the incandescent, arc or hot-air bath. Following this he enters the douche-room, and, after receiving the hydriatic measures prescribed, and reacting properly, he is then dried and retires along the inner hall to the cooling or rest-room, from which he shortly emerges, resumes his street attire, and departs.

It is necessary to have an ample supply of towels, preferably of the rough Turkish variety; linen and Turkish sheets, Turkish bath robes, stockinettes and glovelets for use in the superheated dry hot-air apparatus; several rough linen sheets, a dozen or two of fine linen sheets, some large soft woolen blankets, a pair of double blankets for the wet sheet pack, fomentation cloths made of thin blanket, cheese cloth for compresses, ice helmet, hot-water bottles, etc. The treatment-rooms should be supplied with a large and commodious closet, with tight fitting door and Yale lock. In this closet all the linen, blankets, and various articles mentioned above, should be kept, and if the door fits accurately the moisture in the air will not penetrate and make the articles damp or mildewed. There should be sufficient room in which to place under lock and key bath-robes, bath-caps, shoes, slippers, etc., belonging to individual patients. This may seem a small detail, but the careful enforcement of the rule of keeping things locked up will prevent many petty quarrels between patients, attendants and others, to say nothing of preventing stealing. The douche-room must be supplied with a large nickel-plated brass soap-



PLATE 42—Tobey's Automatic Water Heater; Soap Dish; Towel Rack (Mott).



PLATE 43—Bath Room Accessories; Pitcher; Salt Jar; Thermometer; Fibre Bucket; Bath Room Floor Slats.

stand, with "Ivory" soap for those who desire to use same; a large two-gallon pitcher, preferably of granite ware; large pail and a large jar filled with salt of medium coarseness. It should be borne in mind that perfect cleanliness is one of the prerequisites for the preservation and usefulness of all apparatus enumerated. The room should be cleaned thoroughly daily, the incandescent globes in the incandescent electric light bath carefully wiped free of dust and specks, the nickel-plated trimmings in the douche-room rubbed, and such other housewifely cleanliness maintained as common sense would dictate.

It is a small but practical point to be borne in mind that the nickel-plating and bright appearance of all piping of the various pieces of apparatus will be preserved and maintained if the attendant will be sure to allow very hot water to run through the apparatus just before leaving the treatment-rooms.

In speaking of the electric light bath, it was stated that the attendant must never throw on the main switch while the smaller or knife-blade switches governing the various rows of lights are in contact, as the fuse will be blown. This can be prevented by having the large switch next the ceiling out of the reach of the attendant, thus preventing mischief of this kind. To run an incandescent electric light bath of even moderate size is an item of considerable expense, and attendants should be instructed to *never turn on* the lights until the patient *is* in the cabinet, and to *always turn off* the lights *before* the patient *leaves* the cabinet. This is also true of the arc light, and in less measure of the superheated dry hot-air apparatus.

A large basket should be furnished in the dressing-rooms in which the patient may toss the wet towels that have been used. Most institutions of this kind and sanatoria find many of their towels ruined by that frailty of human nature which leads patients to polish their boots and shoes with other people's towels. For this and for other good and excellent sanitary reasons all towels must be thoroughly washed, boiled or sterilized and then dried. In my sanatorium, for the purpose of drying, an artificially heated drier is used. Small soft towels are furnished for facial use, although in many instances the rougher or crash towel is to be preferred. Each dressing-room, or, what is more preferable, each patient, should be furnished with, or furnish himself, a soft linen sheet in which to enwrap the body during his passage from the dressing-rooms to treatment and *vice versa*. By wrapping the patient in a sheet too rapid evaporation is prevented, and he is not chilled by passing to or from dressing- and treatment-rooms. By just such little details and precautions colds and discomforts are prevented and success secured. There are a number of cases whose reactionary power is so great that they might dispense with the use of a sheet, but from esthetic as well as hygienic reasons it is required. Those persons who chill very easily should

wear sandals, shoes or slippers to and from the bath treatment-rooms. There is no question in these cases but what the difference in temperature at the floor and higher in the room is sufficient to produce this condition. The author would suggest the heelless sandal so much in use in German and Austrian bathing establishments.

Upon leaving the treatment-rooms at the end of the day the attendant gathers up and removes all wet towels and sheets; opens the windows, especially in summer, to secure ample ventilation, and leaves everything in tidy condition. If this becomes a fixed habit the musty odor common in some hydriatic institutions will be obviated.

It is necessary to have a *scale* in all hydriatic institutions, the pivot and other portions of which should be of brass so that it will not rust in the humid atmosphere. As I have stated before, it is necessary to watch the nutritional changes taking place in patients, by the scale, for any marked change in weight should at once challenge the attention of the hydriatic specialist and lead him to modify his treatment according to the aim and purpose to be attained.

There is nothing so valuable to a physician as an intelligent, careful and sympathetic attendant in the bath-room, one who thoroughly appreciates and understands the prescription, and who can intelligently vary minor details to the comfort and satisfaction of the patients. Nurses and attendants soon learn to carefully note the condition of the patient entering the treatment-room. The ability to tactfully induce patients to take a bath who are unaccustomed to cold water is attained only by considerable experience. It is my rule to invariably start with graduated applications both with regard to thermic and mechanical impressions, and in this way much distress is prevented. By gradually accustoming the skin surface to reaction and to the mechanical impressions produced by the more vigorous applications to the external surface, the most sensitive and delicate can be brought to bear very low temperatures and strong mechanical impressions. Here again I repeat that the essential necessity of success not only depends upon the careful and thorough work of the attendant, but upon his securing prompt satisfactory reaction, together with all the exhilaration and stimulation that follow. Nurses who have had long training in hydriatic work can promptly tell, by the touch of the hand, something of the reactive capacity of patients. The attendant should insist, where the patient is strong enough, that he rub himself, and thus aid in bringing about reaction.

Be careful to see that the head is kept cool during the application of any heating procedure, and even during the bath itself. Wet the hair thoroughly and keep a cold towel or turban upon the head during the application. Some men, and nearly all women, refuse to have the hair made thoroughly wet, owing to the difficulty and fatigue of drying the scalp after a thorough wetting of the hair. This can be obviated

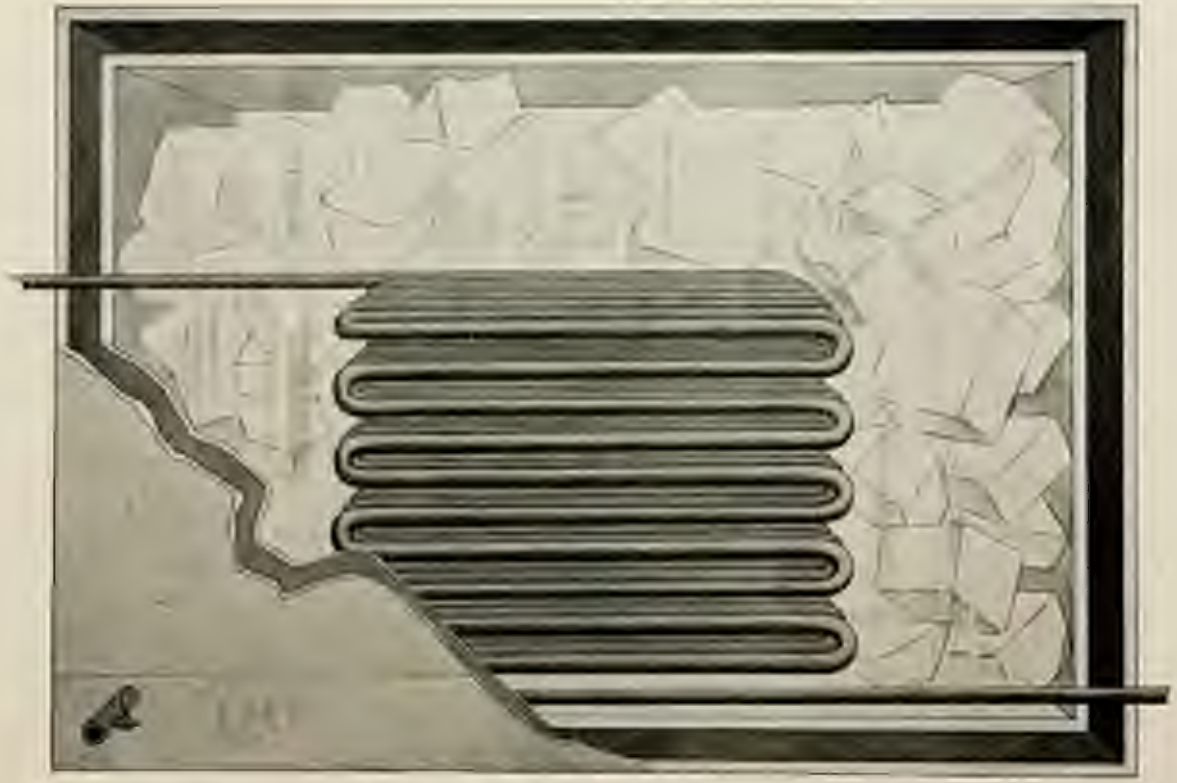


Plate 41.—Water Cooling Device.



PLATE 46—Ice Cap or Helmet; Steam Kettle.

by the use of a cap made of rubber or oil silk, ice helmet, or by bathing the face in cold water just before and keeping a cold towel around the neck during the hot application. The author is very much opposed to a hubbub in the bath-rooms. Hilarity, singing, whistling, noisy talking, loud laughter and joking are decidedly out of place. Quiet should be maintained and patients encouraged not to converse with each other or with the attendant while taking treatment. It has been my observation that in this way better attention is secured and more care taken with the patient.

CHAPTER IX.

THE TECHNIQUE OF HYDROTHERAPY.

As it is in all branches of the healing art, hydrotherapy possesses its proper technique. As a surgical operation is incomplete or a failure unless the proper method is pursued, so in hydriatics those results that can and should be obtained are lost unless care and attention are given to proper detail. Most hydriatists in their treatises upon this branch are prone to magnify and refine each process until the student and practitioner are lost in a maze of minutiæ, become disheartened and give up the study of a valuable measure, possibly the best *single weapon* of his therapeutic armamentarium. My endeavor has been to simplify as much as possible, to group together measures that have similar physiological and therapeutic action, or that employ similar apparatus and technique, thus doing away with needless burdens upon the time and memory of the active man in the field. The time that has to be consumed by the busy general practitioner over such works leads them, as well as hydriatics, to be laid aside for methods more easily mastered.

Having learned the physiological portion of hydrotherapy, we are prepared to understand that the technique may be grouped under six heads, dependent upon the methods used as to whether we desire to obtain—

A. Distinctly local effects.
B. General effects.
C. Purely thermic effects.
D. Thermic effects supplemented by mechanical action.
E. Employing the same apparatus.
F. Having the same physiological action.

In the actual treatment of a case the power to respond to these methods must be carefully studied, or, as Winternitz puts it, "the degree of stimulation" estimated; in fact, here as elsewhere the personal equation and therapeutic need cannot be lost sight of for a moment. The "measure of stimulation" is controlled by means of *four* elements, viz.:

1. Extent of application.
2. Temperature.
3. Duration.
4. Mechanical effects.



PLATE 45—Sponge or Towel Bath

At the present time we are unable to classify from a *physiological point* of view, and for that reason the author offers the following *"Clinical Order,"* it being an advance from the simple to the complex:

- Sponge
  - Hot
  - Cold
- Alternate hot and cold sponge to the spine.
- Dripping sheet.
- Fomentation.
- Compresses.
- Half pack, dry.
- Full pack, dry.
- Half pack, wet.
- Full pack, wet.
- Foot bath
  - Hot foot bath.
  - Cold foot bath.
- Sitz bath
  - Hot sitz bath.
  - Cold sitz bath.
- Half bath
- Full bath
  - Very hot full bath.
  - Hot full bath.
  - Warm full bath.
  - Cleansing full bath.
  - Continuous full bath.
  - Neutral full bath.
  - Effervescent full or Nauheim bath.
  - Cold full bath.
  - Cold plunge.
- Surf bathing.
- Swimming bath.
- Mineral baths.
- Douches
  - Affusions.
  - Showers.
  - Sprays.
  - Jet douches.

The Sponge or Towel Bath; Ablution.

This simple and satisfactory method is universally applicable, and may be employed in the humblest of surroundings. It may be used as an antipyretic or as an introduction in chronic cases to the more vigorous measures. The sponge is usually given to febrile patients in bed. Two basins, containing water at the proper temperature, one of 50° F., the other 70° to 60° F.; a slop jar, two crash rags and several crash towels without fringe is the simple paraphernalia required. The nurse, having arranged the basins, jars, rags and towels handy, slips off the night dress and has the patient recline upon the right side (edge) of the bed (in right-handed nurses) facing the

nurse. The rag is now dipped in the basin of water at 80° F. and the face and neck sponged. The surplus water is squeezed into the slop-jar, the rag re-wet and placed upon the patient's forehead. The patient's left arm, then the right, the left and then the right leg, are successively exposed and sponged with the crash rag, containing all the water it will hold short of dripping. The patient then turns over, lying on the belly, and the back is sponged from occiput to coccyx and over the hips; then turns upon the back, and the chest and abdomen are sponged. If longer time is employed allow towel, after sponging, to remain on back, chest and abdomen three minutes each. As we have previously said, the towel or compress may remain on the abdomen for an hour after the sponge. Very feeble cases, who are febrile, whose circulation and innervation are bad, who are easily exhausted (asthenic), should have each member dried as the application is made, and the towel or compress avoided. After the bath they receive their nourishment, and if they have not reacted a hot-water bottle must be put to their feet. If strong and vigorous (sthenic), do not dry and use the towel or compress. Where this measure is employed systematically during the course of typhoid, bathe, feed and medicate at the one time so that the *patient and nurse* will have intervals of rest. Cold water drinking between times is a useful adjunct.

It is a good plan to start with high temperatures, giving the first bath at 75° F., reducing the temperature of each succeeding sponge five degrees to 60° or 50° F., as deemed wise. Always use cold (50°) or very cold water to bathe the face and neck; re-wet this compress as soon as it gets warm. The water in the rag should be *squeezed* out into the slop-jar and re-wet from the basin to avoid warming the water.

The sponge must be varied to meet certain indications. If the case is febrile, vigorous, with good innervation and considerable antipyretic and stimulating effects are desired, the arms and legs should be *left* wet, in order that evaporation may enhance the anti-febrile action of cold water. When the back, chest and abdomen are reached they should first be sponged, then wet thoroughly one of the crash towels and place upon the entire back, chest and abdomen, or each successively, and *over which* friction is to be applied. It may be wet and re-wet from the basin without removal. Friction, as we have seen, overcomes the superficial contraction, dilates the blood-vessels, and by reflex action, as well as by heat abstraction, acts upon the thermogenic and vasomotor centers in the medulla and cord, limiting heat formation and increasing heat elimination. As we cannot secure friction from a sponge, it should never be employed. In typhoid (mild cases, temperature not above 102.5° F.) this method, repeated, will give excellent results, and may be employed during the entire



Plate 48—Alternate Hot and Cold Sponge to Spine

course of the disease. In this infectious disease the towel may be wet and re-wet several times during the course of the time it remains on the abdomen. The time required for the entire sponge is usually thirty to forty minutes—arms four minutes each, legs four minutes each, back and chest four minutes each, abdomen six minutes. Always keep a cold compress or ice cap on the head as this will prevent a rush of blood to the head, or retrostasis, besides making the patient more comfortable. Be sure to always make sufficient pressure with the rag to create friction. When completed, slip on the night dress, and in febrile cases cover lightly (with sheet).

The *physiological* action is that of cold applied to the external surface, together with the supplemental influence of friction. The peripheral circulation becomes larger through the reflex action of the friction, thus offering a larger surface of blood to the thermic action of the cold. Reflexly, the heart is slowed, the pulse becomes fuller, and the cooled blood current, setting inward, reaches and arouses the nerve centers to throw off the toxic lethargy. The respiration is freer, better oxygenation and elimination take place from this and all other excretory organs. The nervous system is toned, aroused and refreshed; the patient is stimulated, and, as we have before noted, temperature reduced. It is now much used in typhoid, although the valuable effect of the compress with friction is rarely employed.

The author remembers the grateful toning and refreshing influence of the cold sponge at 50° when, several years ago, he had the one and only febrile attack of his life. The intense neural and systemic relief given more than compensates for the temporary discomfort of its application.

As an introductory, in chronic diseases and ambulatory cases, to more active measures, the author uses it as follows: A heating measure is first employed—pack, hot air, electric light bath—after which the patient steps into a foot-tub of very hot water, and is rapidly sponged—face, neck, arms, trunk, legs. There should be considerable friction used, and reaction afterward secured by means of good rubbing with a warm crash towel. This measure I have found of signal benefit as a home remedy in cases that cannot come for institutional treatment. It is astounding what an influence this simple bath will exert upon anemia and chlorosis, in neurasthenics, the pre-tuberculous and others. These cases can apply the treatment themselves, it being generally used on arising in the morning, owing to the fact that the person has accumulated heat upon the surface during the stay in bed.

Hot sponging may be employed in fevers, but is now rarely used. The sponge should be very brief with water at 130° to 140°. It is sometimes useful when applied to the spine in functional nervous dis-

eases, neuralgia, etc., but the author prefers the alternate sponge for this purpose. Alkalies, usually soda, may be added and used in urticaria, pruritus, etc. Friction is not needed.

The alternating hot and cold sponge to the spine is a useful measure that will give relief in certain conditions. It is best performed by using a cloth wrung out of the very hottest water that can be borne (140° to 160° F.), applying it up and down the spine for ten to thirty seconds, followed by a sponge or rag dipped in very cold water (40° to 50° F.), or a block of ice wrapped in a soft towel, for three to ten seconds. These alternations should be kept up three to five minutes or longer, if agreeable to the patient. The alternate sponging of the spine has, in my hands, been chiefly used for insomnia, although it aids in overcoming the unpleasant spinal symptoms of neurasthenia. Most patients state that it has a decidedly reviving effect upon the system. It can be used in all forms of irritation, whether located in the spine or not, in headaches, intercostal neuralgia and general nervousness. It has a decided influence upon respiration and heart action, and for this reason is of value in those troubles accompanied by the sudden failure of action of either of these organs. For the temporary amelioration of the pain and discomfort at the nape of the neck, often complained of by women, it will be found a resource of some value. In bruises, injuries to joints, sprains, inflammations of muscles, the pains of trauma, traumatic arthritis, etc., relief from suffering and restoration of function often follow its use.

The Dripping Sheet or Sheet-Bath.

This is a simple, satisfactory and ingenious method of applying water to the surface of the patient who, for certain reasons, is unable to stand other measures, is bedridden or the subject of acute disease. In applying the sheet-bath the paraphernalia used are a linen sheet, preferably coarse, about three yards long and two yards wide; a pail in which to wet the sheet, a foot-tub for hot water, a dry sheet and some Turkish towels. The nurse, having previously gathered the sheet together by one edge of the long measure, places same in the pail of water at the temperature indicated, ranging from 50° to 70° F., and partially wrings the water out. The patient, having had his face and head, or in women the neck, cooled and protected by a cold towel, turban or ice-cap, steps into the foot-tub containing hot water of sufficient depth to cover well the ankles. If the water in the foot-tub is sufficiently hot, much of the disagreeable sensation of cold will be obviated. The patient now removes the night dress or throws off the dry sheet with which he is covered, and the wet sheet is wrapped around the body in the following manner: Holding the long measure of the sheet in the right hand, the nurse seizes the



PLATE 47—Dripping Sheet—Ready



PLATE 48—Dripping Sheet—First Stage



Plate 48—Dripping Sheet—Second Stage



Plate 50—Dripping Sheet—Completed

upper left hand corner with his left hand, and steps in front of the patient. The patient holds up both arms while the nurse places the upper left hand corner of the sheet under the *right arm*, far enough to reach the back; the patient then lowers the right arm, holding the sheet in place; the nurse rapidly passes the sheet across the front of the body, beneath the left arm, which is immediately lowered to hold the sheet in place. The sheet is then carried across the back, brought up *over* the *right* arm and *shoulder*, *across the chest*, and *over* the *left* arm and *shoulder*. It is then folded and tucked into the upper edge around the neck. Where the nurse is *quick* this operation does not consume more than five to ten seconds, and when promptly performed does away with a great deal of the discomfort of a slowly applied cold body. The lower ends are now tucked between the legs. The sheet being in position, the nurse begins to rub vigorously with *both hands*, using good sweeping strokes, covering the whole surface as quickly as possible, rubbing simultaneously first the chest and back, then the back and abdomen and then the extremities. The rubbing should be continued from one to three minutes, or until the sheet is thoroughly warm. It should be borne in mind that the object aimed at is not rubbing the patient *with the sheet*, but the application of friction *over the sheet*. Rapidity of movement in placing the sheet in position and the quick application of friction are essential, for the object is not to abstract heat, but to produce tonic reaction and a decided cutaneous hyperemia. When the sheet has become well warmed it is quickly dropped, the patient covered with a dry sheet and rubbed thoroughly dry with Turkish towels, after which the bed. If reaction has been prompt, no other application is necessary; if the patient feels chilly, dry friction with the hand will complete the reaction. It should be noted that the patient must be protected from chilling upon removal of the sheet.

This treatment is simple and flexible. The different amounts of water it contains, variation in temperature, the amount and vigor of the rubbing, or the addition of percussion or slapping, will enhance its physiological action. The temperature of the water generally used ranges from 70° to 50° F., but the aim is to reach the colder degree as rapidly as possible. It is the author's custom in weak and bed-ridden cases to commence with mild temperatures of very short duration, and gradually decrease the temperature and increase the duration until the maximum effects are obtained. Patients that are strangers to the hydrotherapeutic reaction will complain at first, but later along will not mind even a temperature of 60° or 50° F. Where the patient is in condition, however, to stand the primary shock, it is my custom to commence with 70° to 65° F., as we obtain a better reaction. The temperatures of the sheet-bath can be materially lowered where a preliminary heating process has been used. For this

reason it is best applied to bedridden, sensitive or debilitated patients early in the morning, when they have the accumulated heat of the night upon the skin surface.

Physiological Action of the Dripping Sheet.—The dripping sheet or sheet-bath is a thermic and mechanical irritant, causing deep gasping respirations, rigor or shivering, but this shock of the first impact of cold upon the surface gives way to a stimulating and refreshing action upon the nervous system. There is a general sensation of warmth and glow in the skin. The peripheral blood-vessels at first contract and drive the blood from the cutaneous surface, but with the reaction that takes place under friction the blood-vessels dilate and blood comes to the surface. The pulse is slowed, heart action becomes more full and energetic, and blood pressure is raised. By this means the work of the heart is diminished. This cutaneous circulatory reaction is pronounced and lasting, and accompanying it are all the phenomena noticed under "reaction." If a tonic effect is aimed at, reaction must be prompt and vigorous; if antipyretic, it must be slowly obtained. The depth of the respirations are increased, more prolonged, and exchange of pulmonary gases favored. Muscular activity is increased, strength engendered, well-being induced, all oxidative and assimilative functions stimulated, and, secondarily, appetite and digestion improve. There is a uniform fall of the rectal temperature, though this is temporary; the axillary readings may remain the same or become elevated. The excellent results obtained from the dripping sheet make it a procedure valuable beyond computation to those practicing in rural districts. It is to be regretted that the general practitioner is, as a rule, prejudiced against hydriatic procedures, and fears the bugbear of cold water.

Therapeutics of the Dripping Sheet.—The sheet-bath is an excellent measure for those who are feeble, bedridden, or undergoing the rest cure, relieving, as it does, the various circulatory disorders associated with these conditions. Owing to the lack of exercise, it is necessary to have some measure by means of which the slow reactions and more or less chronic congestion of the viscera can be relieved. In those digestive states in which we have to deal with diminished secretion, lack of muscular capacity, with relaxed or prolapsed abdominal viscera, the sheet-bath offers a valuable and potent remedy. The author has found it of especial benefit in the Weir Mitchell rest cure treatment, in nervousness, excitability, insomnia, neurasthenia, etc. As an adjunct to the administration of iron in chlorosis and anemia, especially in that form that is prevalent in young girls, accompanied with digestive disorders, the dripping sheet has proved itself to be a most potent factor in the therapeutics of these affections. In the management of diarrhea and dysentery the author can speak from long experience of the value of this measure, used in conjunc-



PLATE 51—The Fumigation—Ready.



PLATE 52—The Fumigation—Pouring the Boiling Water.

tion with the sitz bath and friction. There are few contraindications, the principal obstacles being skin eruptions, neuritis and neuralgia.

The Fomentation.

This application is usually called the "hot fomentation," but, as fomentations are never cold, the addition of the adjective is superfluous. The fomentation is a most valuable procedure. It is applied preferably by means of a piece of old blanket about a foot and a half square, which, after being saturated with *boiling water*, must be thoroughly wrung out by means of a wringer. The simplest manner of constructing this wringer is to use a piece of ducking of sufficient size, to the extremities of which two strong sticks, about two feet in length, have been secured by tapes, a hem or stitching, so that their ends project sufficiently on each side that the nurse may comfortably grasp the ends without coming in contact with the ducking. Its technique is as follows: The patient lies upon the bed or couch, and the part to be treated is exposed and enveloped in a blanket pack covering a considerably larger area than the fomentation, the ends of the blanket being long enough to go well over one another. The nurse heats a large pot of water to the boiling point and then prepares the wringer, after which the skin surface is thoroughly anointed with an oleate—vaseline or cocoa butter. The nurse places the wringer over a bucket or deep basin (see cut), and on it the piece of blanket, a Turkish towel, flannel or woolen cloth, or any other material (the blanket is best), and then pours over the piece of blanket boiling water until it is thoroughly saturated. It is now lifted out of the basin by means of the wringer, allowed to drain for a couple of seconds, and the sticks twisted in opposite directions (see cut) so that every possible drop of water is squeezed out. This is an important element of the technique, for if any water remains we are liable to scald the patient. Little fear of a burn need be entertained *if the part has been well rubbed with the oleate* and all the hot water has been carefully squeezed from the piece of blanket. So essential is this that it should be constantly impressed upon nurses. The nurse takes the twisted wringer containing the hot moist piece of blanket, lays it beside the patient, opens the blanket, then unwraps the wringer, slides out the fomentation upon the affected part and removes the wringer. It must be quickly adjusted to the part, the blanket closed, and all air *excluded* by drawing the blanket pack tightly over the fomentation, and especially close at the ends. The patient will likely complain of the intense heat, and squirm some, but must be encouraged to bear it, as this will disappear as soon as the tissues relax. If the heat cannot be endured, the nurse may "ease" matters a little by lifting the fomentation from the surface for a few seconds, without greatly loosening the blanket pack, and again dropping it in place and retightening

the pack. The fomentation may remain in place for five to ten minutes, and may be immediately repeated, or again as soon as the physician deems wise. If it is immediately repeated the parts must be kept covered by the blanket pack, and the process gone through with as little loss of time as possible. Two pieces of blanket will be found useful on such an occasion, the nurse preparing the second one while the other is in place, being thus enabled to make the exchange with great rapidity, a feature much to be desired. The beneficial effect of the fomentation can be decidedly enhanced by terminating the treatment with a brief cold application not to exceed a minute. The part is then dried, rubbed briefly with the dry hand and protected from the air.

Physiological Action of the Fomentation.—The immediate effect produced by the contact of this very hot body is that of pain, accompanied by a blanching of the tissue, due to contraction of the blood-vessel walls. The confined heat, acting upon the sensory nerve terminations and penetrating the tissue by conduction, causes almost immediately a dilatation of the blood-vessels of the skin and contiguous tissues, through paralysis of the constrictors and relaxation of the contracted muscular tissue in the blood-vessel walls themselves. Primarily a local revulsive, excitant and stimulant of functional activity, it becomes secondarily a sedative, relaxant and analgesant of no mean power. The high temperature stimulates local leucocytosis, is antibacterial, relieving inflammation. Anatomically related areas may be influenced by its use. It may be employed as a derivative to relieve congestion, pain and inflammation. It is a stimulant of tissue metabolism, increasing the functional activity of a part through the augmented circulation and nerve action. Where long continued, the part, upon its removal, follows the law of heat, becomes atonic, its processes and vitality lowered. This may be obviated by a very brief application of cold. The best results are obtained when the fomentation causes slight pain when first brought in contact with the skin. Its temperature should range from 140° to 160° F.

Therapeutics of the Fomentation.—It is a simple method that has a wide field of application, and in skilled hands its action is often magical. In all those states, acute or chronic, which are attended by congestion, inflammation and pain, we find the fomentation indicated. Where we wish to increase tissue change, leucocytosis, absorb swellings and exudates, we may expect most satisfactory results, especially when it is followed by the cold, cool or stimulating compress. In spasmodic muscular states, tremor, cramps, colics accompanied by cramps; in gastritis, enteritis, hepatitis, cystitis, peritonitis, all inflammations of the pelvic viscera, external organs of generation; in suppressed menstruation, dysmenorrhea, amenorrhea, ovarian neuralgia, whether acute or chronic, the fomentation is indicated. Where pain



PLATE 53—The Fermentation—Removing Water with Wringer.



PLATE 54—The Fermentation—Removing Water by Using a Twisted Towel.



PLATE 55—The Presentation—in Position



PLATE 56—The Presentation—Completed

of any origin is presented—in headache, backache, "head-pressure" of neurasthenics, spinal irritation—it gives almost immediate relief. After surgical procedures its judicious application will give much relief and avoid the use of narcotics. For the relief of pain after dilation of the sphincter ani it is a specific. The pain of strains, sprains and dislocations is relieved by the relaxation of tissue which it brings about. In facial acne it relieves the inflammation and congestion, stimulates the glandular structures and prevents the accumulation of sebum. The fomentation can be abused by too frequent use, and must, like all other measures, be adapted to the case in hand. Care must be taken to avoid "catching cold" after its use, as general perspiration is usually present. In paralytics, in some forms of neuritis, and in all forms of myelitis or lesions accompanied by trophic troubles, the fomentation is to be avoided or carefully used. The author has been unable to discover any advantage from the addition of medicines to the water of the fomentation; what we desire is moist heat at high temperatures.

Compresses.

The compress is one of the simplest of hydriatic procedures, but is in many instances a most efficient method of applying water to the treatment of disease. It consists of a number of folds of old linen, cheese cloth, or other suitable material of such size, shape and length as to conform to the anatomical lines of the part treated. If the compress is to be greatly prolonged, a rubber bag or rubber tubing, through which water at the proper temperature is continually passed, may be applied over the compress to maintain the desired temperature. The malleable Leiter coil, a well-known tubular arrangement, through which water of any desired temperature can be made to flow, offers an ideal method for maintaining the temperature of any compress, and their malleability enables them to be adapted to any and all anatomical irregularities. Where neither rubber tubing nor the coil is used, the compress must be frequently changed—in fact, renewed as soon as they have lost an undesired degree of their original temperature.

It is important to know that if the cold compress is not renewed with sufficient frequency it will act less as a cooling and rather as a stimulating agent, an effect opposite to that of a true cooling compress. The compress of linen or cheese cloth is wrung out of water at the proper temperature and moulded to the part. It should be fairly wet, but not dripping. In the stimulating and hot compress the linen cloth is surrounded by several layers of flannel, or linen, or any impervious material of the same shape, but somewhat larger in every direction. The author prefers flannel, as it best prevents evaporation or heat loss. This compress is a localized wet pack. Compresses are classified by temperature:

1. Cold compresses (cold, 50° F. and below; cooling, 55° to 70° F.).

2. Stimulating compress (50° to 70° F.).

3. Hot compress (110° to 130° F.).

The cold compress is used principally for its antithermic and antiphlogistic effect, tending to subdue inflammatory conditions by direct heat abstraction, by inhibiting chemical and bacterial processes. This action can be enhanced by wringing out less water. In climates or under circumstances where cold water or ice cannot be obtained, we may have recourse to chemical means. Of this, Kellogg[1] says: "A very satisfactory substitute may be found in ammonium nitrate. This chemical substance has the property of absorbing an enormous amount of heat in passing from the solid to the liquid state. By adding to a quart of water eight ounces of nitrate of ammonium, a temperature of 41° F. was secured, the initial temperature of water being 70°, and the temperature of the room in which the experiment was made being 70° F." The *stimulating* compress differs from the cold compress in that reaction is aimed at in order to secure a stimulation of the metabolic and vital processes locally. This compress should be allowed to remain on the patient until it is nearly dry. The *hot* compress is a means of applying heat locally, and for this reason an effort should be made to retain the heat as long as possible. It resembles the fomentation, but is not as revulsive or intense in its action. It increases the blood supply of the part, stimulates tissue change, causes local break-down and pus formation by enhancing local nutritive processes. It is a cleanly substitute for the "old-fashioned poultice." The action of each may be intensified by brief interruptions and alternations of temperatures; thus a cold compress will be more effective if at proper times a brief hot application is made, and *vice versa*. When once the physiological action of the cold, cooling, stimulating and hot compress is understood it becomes unnecessary to study these effects as applied to each subdivision, for a compress, whether it be to the head, foot, leg, trunk, chest or throat, is a compress, and may be cold, cooling, stimulating or hot, may be alternated, hot or cold, without the necessity of considering separate physiological action.

Physiological Action of the Cold and Cooling Compress.—The first effect of the cold and cooling compress when applied to the surface of the skin is contraction of the superficial tissues and blood-vessels, thereby restricting the amount of blood in the part to which the compress is applied, at the same time causing an increased activity in blood-vessels reflexly related to this surface. As the aim is to avoid reaction, it becomes necessary to maintain a constant temperature, which can be attained by frequently renewing the compress, or,

[1] Kellogg, J. H.: "Rational Hydrotherapy," p. 772.



PLATE 57—Stimulating Compress—Compress in Position.



PLATE 58—Stimulating Compress—Completed.



PLATE 59—Cold Cap to Head



PLATE 60—Precordial Compress and Ice Bag—the "Hydrotherapeutic Dorsalis."

What is better, use rubber tubing, Leiter coil or ice-bag, by means of which a uniform temperature can be kept up for some time. As the skin absorbs the cold a decided impression is made upon the peripheral nerves underneath the compress. With the prolonged cold the sensory and other nerves become very much benumbed, thereby abolishing all the intricate reflex actions that arise from an ordinary application of cold by the semi-anesthesia induced. This is followed by a secondary dilatation of blood-vessels in vascular areas associated with the compress, which serves to further drain the blood from the part treated, although there is a constant tendency on the part of the circulation to overcome the cold by an afflux of arterial blood to the area. Exudation, tissue change and circulation are restricted because of the lessened quantity of blood and diminished local nerve action. The blood stream becomes slower, the surface bluer from the presence of reduced hemoglobin in the veins. The contraction of the vessels of the area remains so long as the temperature is maintained. Its influence upon the blood itself is to diminish the hemoglobin and thereby decrease its oxidizing power, increase the reduced hemoglobin in the veins, lessen exudation of the serum, retard leucocytosis and decrease the red corpuscles. The temperature of the part is reduced from two to five degrees, and this can be maintained by a careful and judicious changing of the compress. This diminution in temperature we are prepared to accept when we realize the lessened circulatory and tissue change taking place. It is for these reasons in the early stages of inflammatory troubles that the cold or cooling compress has gained its reputation as an antiphlogistic, its usefulness being greatest where the circulation is still active or open in the part affected.

Upon the muscular system it is an inhibitant, lessening activity and movement—true of both striated and non-striated tissue. Its action reflexly upon muscular tissue is best noted in the application of a compress or the ice-bag over the heart in case of a cardiac insufficiency or rapidity. After a moment cardiac action is fuller and blood pressure raised. Long-continued application of cold over the heart depresses cardiac activity.

Where the cold or cooling compress is continuously applied to the head the influence is less marked upon the circulation than any other region of the body. The general systemic temperature may be reduced, for the bones of the skull, being thin and covered with soft parts that are free from subcutaneous fat and thick muscular layers, the cold conveyed by conduction to the cerebral thermic centers lessens heat production.

Therapeutics of the Cold and Cooling Compress.—From the foregoing physiological action it is at once apparent that the chief and most valuable use for this compress is in localized inflammations and where it is desired to limit the quantity of blood circulating in a part.

Applied to the head it relieves headaches, especially where the pains are of a "nervous" type, or associated with hyperemic or "congestive" states. Care must, however, be exercised in continuous application, as stubborn and persistent pains of a neuralgic character may follow its use. In the delirium of fever, in meningitis, mania, "cerebral congestion," it is valuable, relieving pain, reducing fever and inflammation.

The hydriatist finds it a valuable measure to prevent retrostasis that would otherwise occur at the time of the application of heating procedures. In women who refuse to have the hair made wet the cold or cooling compress applied around the throat will serve the same beneficent purpose. In inflammatory diseases of the chest it has some ardent advocates, Mays[1] speaking especially of the local use of the ice-bag. In this field its action is, in my opinion, limited, the stimulating compress being better. From a wide experience with the cold compress and ice-bag in cardiac diseases the author can speak of its remarkable and valuable efficiency. This is so true that I have often wondered why the general practitioner never uses it in the cardiac insufficiency of fevers or diseases of the heart itself. In endocarditis and myocarditis it controls the inflammatory process, strengthens heart action and relieves distress, the only contraindication being degeneration of the heart muscle itself. Syncope due to heart failure, as well as cases of rapid pulse functional in character, soon respond to its use. I have found it the most satisfactory method of reducing the rapid, feeble and thready pulse-rate of exophthalmic goitre, using it intermittently, two to four times daily, for twenty to thirty minutes at a time. Applied over the stomach and used in conjunction with small pieces of ice swallowed, it is an efficient antidote to vomiting. Placed upon the spine opposite, just below the wing of the scapula, it relieves pains of all kinds in the stomach, even those of cancer and ulcer. The ice-bag and compress used over the stomach and intestines reduce hemorrhage. Used half an hour before meals, it increases appetite and the secretion of gastric juice. In appendicitis it may be employed as a supplemental measure to Ochsner's method.

In typhoid fever the cooling compress is a useful adjuvant to the cold sponge, and should be placed over the large areas of the back, chest and abdomen, especially the latter. In inflamed and prolapsed hemorrhoids, and the testicle in orchitis, pain is relieved, inflammation diminished and comfort secured. Applied to the throat, it relieves inflammations, whether they be of an ordinary bacterial or post-operative kind; in fact, in preventing post-operative inflammations, this compress has been of signal service in the hands of the author, particularly where it is later followed with the stimulating compress. In the early stages of inflamed joints, wounds and like conditions in

[1] Transactions Philadelphia Medical Society, 1899, p. 387.



PLATE 65—Triangular Throat Bandage



PLATE 66—Joint Compress



Plate 67—Throat Compress.

the extremities, it has a markedly sedative and curative effect. If the ice-bag is laid across the trunk of an artery it is more effective in reducing the blood supply of the part to which the artery is distributed than an application made directly to the part itself; and an application made to the axilla, the bend of the elbow or knee will control inflammation in the distal portion of the limb more effectively than a cold application to a hand or foot. It must be borne in mind in making an application of the *ice-bag* or of ice in any form that a compress be placed between it and the skin, preferably wring out of very cold water.

Physiological Action of the Stimulating Compress.—The aim in this compress is to secure reaction, and unless this is attained its object is defeated. Its effect is very similar to that of the pack, to be hereafter described, except that it is more localized and circumscribed. The cold of the stimulating compress causes the cutaneous blood-vessels to contract vigorously, through direct and reflex action, driving the blood out of the area and lessening the circulation. Varying with the temperature of the compress and the reactive capacity of the patient, there ensues a dilatation or hyperemia of the parts surrounded by or in contact with the compress. With the increased circulation of arterial blood in the part the compress becomes heated, the impervious flannel covering preventing dissipation and favoring accumulation until the compress gradually attains and rises slightly above the temperature of the parts with which it is in contact. If continued the compress gradually becomes dry, evaporation of the water taking place. By reflex action of the vasomotors the deeper blood-vessels related to the parts, both anatomically and reflexly, contract, enhancing the blood supply beneath the compress. Its influence upon the peripheral nerves is sedative, for it envelops them in a moist warm vapor, making the nerve terminations more succulent, thus reducing their irritability. When the action is fully established it diminishes irritation in nervous structures reflexly related to the area. Local tissue change is enhanced, the active and improved blood supply removing waste material. Upon muscles it has a tonic influence, enhancing tissue change in them and improving their tone. Winternitz[3] has called our attention to the fact that the blood itself is influenced by local stimulating compresses, increased the hemoglobin, red blood cells, and in moderate degree leucocytosis, there being a particularly noticeable increase of the red blood cells.

It will, of course, be realized that with the increased temperature and other physiological reactions bacteria and toxins are neutralized and more rapidly removed from the part. Should chilliness be experienced it will be due to a failure of the part to react, which can be counteracted by at once removing the compress and applying

3 Winternitz, Lehrbuch der Hydrotherapie, p. 94.

friction or colder water. Where patients have feeble reactive power it is well to first commence with milder temperatures.

Therapeutics of the Stimulating Compress.—In inflammatory diseases of the throat, and especially in tonsilitis, this compress is most effective, and under its influence the process rapidly ceases. In post-operative cases, where stimulating compresses have been carefully and persistently used by the author, healing has been accelerated nearly 40 per cent. This compress should be more utilized by the throat specialists than it is. In chronic catarrhal conditions of the tonsils, pharynx and larynx, the persistent and painstaking use of compresses will do much. In pneumonia we find a valuable adjuvant in the chest compress applied as Baruch[4] says, "every few hours when the temperature is above 102.5°, and removed when it falls below 100° F. The cold compress produces deep inspiration, contracts the cutaneous vessels, which rapidly dilate, and soon forms a soothing poultice, maintaining tonic dilatation, which aids the heart in propelling the blood through the contraction of the vascular ends which warm applications would paralyze by relaxation. That temperature is also reduced by wet compresses in pneumonia has repeatedly been observed." In chronic bronchitis where access cannot be had to other measures, the stimulating compress offers an excellent means of allaying cough, increasing expectoration and bringing about resolution.

The stimulating compress has received the commendation of the best authorities, not only for its influence in encouraging vital resistance in the diseased structures, but for the purpose of maintaining and lengthening the reduction of temperature secured by the Brand or full bath. It finds a useful field in all forms of inflammatory trouble of the gastro-intestinal tract (gastritis, enteritis, colitis, hepatitis, appendicitis, peritonitis). During the interappendicial period the wearing of a wet stimulating compress over the right iliac region is a valuable means of preventing a recurrence of the condition, and should be used more by the physician and surgeon than they are in the habit of doing at the present time. In the various forms of rheumatism this compress may be used as well as in many cases of old exudations in the extremities or near the surface of the body. It should be distinctly understood, however, that in these cases there are very much more satisfactory methods in handling the case than by means of the compress, especially the use of superheated hot air followed by the more active hydriatic measures. In old ulcers of the leg the application of a wet gauze compress, together with the spiral reverse bandage, is a method sanctioned by long and successful usage.

4 Baruch, Simon: "Hydrotherapy," 1901, p. 293.



PLATE 61—Chest Compression.



PLATE 62—Chest Compression—First Step.



PLATE 63—Chest Compression—Second Stage.



PLATE 64—Chest Compression—Completed.

Hot Compress.

This compress is applied similarly to the stimulating one, the object being to retain the heat. The material used should be ample, and larger than the area to be covered. The linen, blanket, cheesecloth, etc., may be covered or protected by flannel or any other suitable material. The method I generally employ is to have the patient lie upon the couch or bed; the part to be treated is exposed and lubricated with vaseline. The compress is applied at the temperature desired, care being taken to wring the material sufficiently dry to prevent burning. If the clothing, bed or couch gets wet, it is likely to chill the patient and later cause a "cold." The rapidity with which a nurse works will have something to do with the efficiency and results of the hot compress. The duration of the application varies according to the temperature of the compress, the temperature of the room and the amount of water contained in the compress itself. It is a good plan, after several very hot compresses, to apply a hot-water bottle over the compress. Compresses are usually used to relieve pain; a safe rule is to remove, re-wet and replace them every half-hour as long as the pain is mitigated. Every hour a momentary stimulating effect can be obtained by using a cold (50° to 60° F.) compress for thirty seconds, then reapplying the hot compress. It should be remembered that a hot compress is *always* to be followed by a brief tonic application of cold, which should not exceed one-half minute. The parts are then well dried, finished with manual friction, covered with the patient's underwear or some other covering, remembering that evaporation and slow chilling defeat the object of this procedure.

"In an emergency a flannel cloth or a cloth of any sort may be wrung out of water and wrapped around a stovepipe, or laid upon the top of a stove, or held against its side for a few seconds until heated. To prevent soiling by contact with the stove, the cloth may be placed between the folds of a newspaper; the newspaper, being moistened, will not burn." (Kellogg.)

The final application of cold produces a reaction, tonic and circulatory in character. (See Fomentation.)

Physiological Action of the Hot Compress.—The immediate influence of the hot compress is hardly pleasurable, and produces considerable excitation for a short time. Its action, though similar to the fomentation, is not nearly so powerful or excitant. Immediately upon its application there occurs a transient contraction of the blood-vessels, quickly followed by dilatation. After a short while, vasomotor paresis takes place; the vessels, large and small, dilate enormously, the skin assuming a red and turgid appearance. This paresis of the blood-vessels produces a slowed circulation, and is a "passive hyperemia." By local and reflex action of the vasomotors the ves-

sels of the deeper structures related to the parts, both anatomically and reflexly, contract, while those at the surface fill with blood, a collateral anemia taking place in the deeper associated areas. This collateral anemia is an explanation of why hot compresses relieve deep-seated inflammations. Upon the peripheral nerves it is at first excitant, soon followed by marked sedative effects. The pain sense is dulled; the nerve terminations enveloped in hot vapor are rendered succulent and their irritability reduced. Reflex action is lessened, local tissue change is enhanced, migration of white cells increased, and the lymph stream made active. Upon the muscular system it has a relaxing effect, too well known to comment upon, probably no remedy being so efficacious in cramps of all kinds. Upon the blood Baruch[1] noted the following:

"In order to ascertain the effect of warm compresses, the composition of blood from the finger tip and from the skin over the abdomen was studied. The finger tip blood showed 95 per cent. of hemoglobin and 5,300,000 red cells; the blood from the abdominal skin showed 120 per cent. of hemoglobin and 7,000,000 red cells; while the leucocytes were 7,000, about the same in both specimens. After a warm compress (122° F.) had lain for one and one-half hours upon the abdomen a comparison was again instituted, showing that in the blood from the finger tip the hemoglobin had increased 10 per cent. and the red cells 90,000; the leucocytes had also increased 1,000. But the blood taken from the skin of the abdomen beneath the cataplasm had lost 22 per cent. of its hemoglobin and 2,500,000 of its red cells, while the leucocytes were doubled."

Influencing circumscribed and local inflammations by leucocytosis, suppuration is brought about when this is desired, constituting, as it does, a clean, neat and valuable substitute for the old-fashioned poultice. It quickens metabolic changes, encourages absorption of exudates, and probably, through its high temperature, helps nature to destroy morbific products, just as fever is now considered by many to be beneficent, and to aid the natural resources in their fight against enemies, toxic and bacteric in character.

Therapeutic Action of the Hot Compress.—It is valuable for its pain-relieving qualities. In acute pains, due to trauma, irritation, stasis or swelling, whether located in muscle, skin, nerve, bone or joint; spasms, synovitis, toothache, earache, anemic headaches, migraine, inflammations of the throat, tonsils, etc., great relief is given. It may be employed to stimulate absorption and remove swellings or effusions. In inflammatory conditions of the abdominal and pelvic viscera, by its pain-relieving, relaxing and absorbing influence, it may be applied directly over any of these organs, the congestion of which will be relieved by the afflux of blood to the skin. In chronic pains, even of organic disease, if applied thoroughly, it will do major service and

[1] Loc. cit., p. 124.



Plate 68—Pelvic Pack—Ready



Plate 69—Pelvic Pack—First Stage



PLATE 70—Pelvic Pack—Sacral Stage.



PLATE 71—Pelvic Pack—Completed.

give much temporary relief. In all forms of gastro-intestinal inflammation, in hemorrhoids, after division of the sphincter ani, this compress is indicated. It must be stated, however, that, as a rule, the fomentation gives better results.

The Cephalic Compress.

The head compress is probably the most generally used of these applications, and is utilized by the lay member more or less constantly in the treatment of various conditions of cerebral discomfort. One of the most satisfactory, and at the same time simple, methods of applying the compress to the head, is by means of a towel in the form of a turban. A towel of sufficient length and size is placed under the patient's head, on a line with the top of the ears; the left end is first brought over the forehead and carried around to the occiput; the right side is carried around in the same manner and the open end turned to form a closed end, resting on the forehead, somewhat resembling the Tam O'Shanter cap. The towel should be dipped in water at a temperature ranging from 40° to 60° F., and repeated at short intervals. The writer has also utilized the head-coil and ice-bag in connection with the compress, and has found that it is very much more satisfactory than the use of the head-coil or a compress alone; in fact, the head-coil should never be applied without some light compress between it and the scalp. The cold compress is used by the hydriatist constantly during the application of heat upon the surface of the body, for such measures tend to produce retrostasis, or "rush of blood to the head." It therefore finds a useful place during the application of the electric light, arc, hot-air baths, and during the administration of the various forms of packs.

The Throat Compress.

The throat compress is rarely properly applied, for, while it is generally termed throat compress, the application in ordinary hands is more often to the neck, rather than to the organs of the throat and upper throat. The writer has found in his experience that the involvement of pharynx, tonsil and larynx is so common, both by simultaneous invasion or rapid extension from one to the other, that he has gradually evolved the following method of applying the throat compress: A piece of old linen is taken of sufficient length to pass around the neck and over the head once, after being folded twice upon itself to make four layers. Starting on the left side of the head below the left ear, the compress is carried over the top of the head, over the right ear, and then encircling the throat. In like manner a flannel bandage is carried over the linen compress several times, and applied with sufficient tension to cause the compress to fit closely and snugly in contact with the skin. Slits are then made in both the

compress and flannel roller, to permit the egress of the ears. The writer has found in his experience that it is much better to cut and measure the compress and bandage before putting them on the patient's head. The linen is immersed in water at a temperature from 50° to 60° F., and wrung out sufficiently dry to prevent dripping. Where it is necessary, as in restless adults or children, to secure the compress tightly, it is well to take a turn or two with the roller from the forehead to the occiput, thus encircling the head. The whole compress will be made more secure and retain its position better if the crossings are pinned with small safety-pins. The object of this compress is to bring under its influence the skin and organs contained within the two triangles that have for their apex the ear and for the base the clavicle, for unless the compress reaches up and over the angle of the jaw, it is practically valueless, as the tonsils are principally involved. It is generally used for acute inflammatory troubles. A special "permanent bandage" in the shape of a spring collar has lately been placed upon the market,[1] which enables this useful compress to be easily applied. It is made of elastic celluloid, with raised sides, the inner side of which is lined with soft felt, which is moistened with water at the desired temperature before it is used (see cut). It is quickly adjusted and remains well in place. It is made in sizes ranging from ten to twelve inches to fifteen to eighteen inches, and is very moderate in price.

The Chest Compress.

The compress, when used upon the chest, is usually a stimulating one—in reality, a chest pack—and for this reason it must be so applied as to exclude all air. The simplest way is to make *several jackets* (see cut). Take a piece of linen large enough to go around the chest, and lap eight or ten inches, and to extend from the clavicle to about the last rib. Place this beneath the patient, and draw around the body until the ends lap. Now cut slits for the arms, which are then enlarged to snugly fit these members; then stitch the three layers together. In the same manner prepare *two flannel jackets*, an inch longer at the neck and two inches at the abdominal end. Being ready to apply the compress, dip it in water at a temperature from 50° to 60° F., and wring out until it no longer drips. Now spread out the flannel jackets and lay upon them the wet compress, being careful to get the slits in the compress and flannel jackets in proper apposition; fold or roll from each end until the compress presents a double roller appearance (see cut). Turn the patient gently on the *right side*, without the slightest exertion on his part; place the rolled compress on the bed and unroll the *left half*, slipping the *left* arm into the *left slit* (see cut), and quickly placing the compress upon the

[1] Kny-Scheerer Co., 124 Fourth Avenue, New York City.



PLATE 72—Full Wet Pack—First Stage.



PLATE 73—Full Wet Pack—Second Stage.



PLATE 74—Full Wet Pack—Third Stage.



PLATE 75—Full Wet Pack—Fourth Stage.

chest. Repeat the same process with the right side, and then allow the patient to lie upon the back; the ends of the compress are first lapped, then the underneath flannels carried closely and snugly over the compress. In like manner the outer flannel is tightly adjusted and secured by safety-pins in front. The upper edges are now neatly tucked around the neck and secured by safety-pins upon the shoulders. A soft towel or strip of linen is then tucked in at the neck to prevent the disagreeable irritation of the flannel (see cut). The chest pack is of value in inflammatory processes of the lungs and pleura.

The Trunk Compress.

The trunk compress may extend from the axilla to and over the hips, thus embracing the chest, abdomen and pelvis. Where it is limited to the chest, abdomen or pelvis, it is generally called by the name of the anatomical region embraced. In its essential features it is one and the same. If it is to be used as a cold or cooling measure, one or two heavy crash towels are wrung out of water at the desired temperature (40° to 70° F.), applied to the region, and renewed as frequently as they become warm. If a stimulating or hot compress is used, a single blanket is folded once lengthwise and placed under the patient's back (see cut), the compress, wrung out of water at the proper temperature, placed in position (see cut), and the blanket wrapped tightly over same. If a pelvic pack alone is given, we may better apply same by a sheet and two blankets, which are prepared as follows: The first blanket is folded lengthwise and placed *across* the bed so that the patient's back rests upon the middle. The second blanket is then folded so as to form a triangle, the apex of which is placed between the patient's legs. The sheet is similarly folded—about two inches smaller, however—and fitted on the second blanket (see cut). This compress or pack is generally given very hot, and is known as the "*hot pelvic pack*" or compress. The patient elevates the night dress, exposing the pelvis, and lies so that the apex of the second blanket is between the legs. The nurse now pours boiling water over the sheet (the wringer is very useful, see Fomentation), rapidly places it in position, draws up the apex point between the legs first, then the two side ends, until the sheet now resembles an infant's napkin (see cut). In like manner the triangular blanket is applied, and over all the blanket folded lengthwise. This must be snugly done, air excluded, and secured in place by safety-pins (see cut). A rubber sheet will further prevent heat loss. The hot pelvic pack is a favorite method with the author.

A stimulating compress, much used in Germany, and called "Neptune's girdle," consists of a *linen* bandage ten to twelve inches in width and three to four yards in length. One-third to one-half of this length is wrung out of water at 50° to 60° F., applied to the ab-

domen or pelvis, as the case may be, and the dry half wrapped around the wet and pinned. It is of undoubted value in gastro-intestinal affections, in which field it has obtained its greatest popularity.

The Joint Compress.

This is simply a piece of linen wet in water at 50° or 60° F., enveloping the joint, and secured in position by a flannel bandage or some other proper material. Its action is obvious, and it is principally used in inflammations of the extremities (see ants)

The Wet Pack.

The full wet pack is one of the most useful and valuable of all hydriatic procedures, and should be more extensively employed, for it can be utilized in home or hospital practice, and where judiciously used will yield results the equal of many more vaunted procedures. There is no method, in my opinion, in the wide range of hydrotherapy, that it is so often faultily applied as the wet pack. It is best applied upon a cot or bed, over the mattress of which a rubber sheet has been spread. The following manner of proceeding has been found best by the author:

Two large woolen blankets, preferably gray in color, are spread upon the mattress and allowed to hang over the cot equally on either side. The blankets should be long enough to extend at least eight to twelve inches below the feet, and the end above must come to a level with the ears. A rough linen sheet is now well wrung out of water at a temperature varying from 50° to 80° F., appropriately graduated to suit the case. The sheet is spread upon blankets so as to leave a few inches of blanket margin at the neck end. The patient, completely disrobed, places himself upon the middle of the sheet, with his arms and legs slightly separated from contact with the body or themselves. The patient should be made to lie so as to allow three inches of the sheet to project above the shoulders.

The nurse, standing on the *left* side of the cot, grasps the upper *left* hand corner of the sheet, and has the patient raise the arms; the sheet is then brought under the left arm, across the chest, and is tucked snugly around the neck and under the right side of the trunk; the right leg is then raised and the sheet carried over the *left* leg and under the right one. The arms are now lowered and the upper *right* hand corner of the sheet brought over the right arm, over the chest, *over* the *left* arm, and is then tightly tucked under the *left* side of the trunk. The upper edge should now be folded and tucked around the neck and under the chin. The lower edge is then carried over the right leg and tucked under the left, and the open end below the feet *loosely* folded over the toes and feet and tucked *under the heels*. A fold over each shoulder will help to make the sheet lay smoothly



Plate 26—Full Wet Pack—Fifth Stage



Plate 27—Full Wet Pack—Sixth Stage



PLATE 78—Full Wet Pack—Seventh Stage



PLATE 79—Full Wet Pack—Completed

around the neck. If properly done, every bit of the cutaneous surface is in contact with the sheet, except that of the face and head.

The next step is to apply the blankets. In a manner similar to the application of the sheet, the upper left hand corner is carried across the trunk. The *lower left* hand end is then carried over the *left* leg, and the lower limbs closely drawn together. The right side of the blanket is then carried across and folded over the shoulder, trunk and legs. The nurse should now endeavor to *pull* the blankets as *closely to the body as possible*, for unless this is well done air will not be excluded, and the loosely applied blanket causes discomfort and fatigue. The second blanket is now applied over the first in like manner. The open ends at the feet are then folded closely together and turned under the feet. When completed, the patient is enveloped in sheet and blankets similar to a mummy. A soft towel is next taken and tucked around the neck to prevent the woolen fibers from irritating the sensitive skin of the neck and face. This assists in excluding air.

A cold wet turban or ice-helmet should then be applied. A simple way of applying the turban is as follows: Take two towels *without fringes;* place one upon the other and wring out of very cold water; wet the patient's hair with cold water and place his head upon the center of the edge of the towels; carry one side up back of the ear and fold over the forehead, and repeat on the other side; fold the loose ends squarely from behind forward, and a neat cap is formed. If this is not permitted, a cold circular compress may be placed around the neck, or a cold compress laid on the face.

The time usually required for a skillful nurse to apply a pack is about three minutes. It should at this point be again noted that unless *all air has absolutely been excluded the aim of the pack has been defeated.* The sheet should be of *rough* linen, and it may be stated that a fair average temperature is 60° F., though patients should be educated to this temperature by several packs of a higher degree. If the patient desires water to drink during the pack, it should be given. A hot-water bag is comforting when applied to the feet, especially in those whose extremities are habitually cold.

Physiological Action of the Wet Pack.—The first contact of the cold wet pack is disagreeable—a chilling sensation accompanied by tremor and shaking. Irritation of the cutaneous nerves by the cold, with contraction of the peripheral vessels, lasts until the individual's power of reaction comes into play. This depends, as in all hydriatic procedures, upon the condition of the patient. Nervousness may be increased, but will disappear and give place to relaxation and calm when full reaction takes place.

The efficiency of the application of the pack itself will have something to do with the patient's reacting or "warming up," for chill in

the pack may be due to the fact that at some points the wet sheet is not in perfect contact with the surface. If this is the case, evaporation takes place, with cooling, instead of heat accumulation and vigorous reaction. If the feet do not warm readily, they may be left out until reaction is improved, or, what is better, the hot-water bottle applied for a short while. This stage usually lasts from five to fifteen minutes, when, reaction commencing, the system makes an effort to equalize its effects. The duration of the pack should range from thirty to sixty minutes, depending upon the effect desired—the shorter tonic and invigorating, the longer sedative. When reaction sets in and the peripheral blood-vessels dilate, the patient feels a delightful glow, a sensation of comfort and well-being.

Upon the circulation, the pack at the outset produces peripheral contraction, driving the blood from the skin into the internal viscera; the skin is pale and goose-flesh appears. During this stage Mueller, in trephined rabbits, noticed a rapid dilatation of the arteries of the pia mater. Usually, after a period roughly averaging ten minutes (this time being required, as there is complete lack of mechanical aid to dilatation of the blood-vessels), reaction takes place. The peripheral blood-vessels dilate, the skin assumes a pinkish hue, the sheet warms up, the patient being now enveloped in a moist vapor. The entire bodily circulation is accelerated and the column of blood which sets in toward the viscera returns to the surface, assisted by the unobstructed vascular conditions and better heart action, securing a more complete exchange between cutaneous and visceral blood. The pulse is accelerated at the commencement, but later becomes slowed, of fuller volume and better tension. The wet pack is a strain on the individual's circulation, as he has to depend entirely on his own vital capacity and resources for reaction.

Upon *respiration* the first impression of the pack is one of discomfort and accelerated breathing. The patient may complain of thoracic constriction, which subsides with the onset of reaction, at which time the respirations become slow and deep, with increased absorption of oxygen, elimination of CO_2 and other waste materials. Expectoration is increased, noticeable in cases of inflammatory trouble of the bronchial tubes.

Upon *temperature* the effect depends upon the duration of the pack. During the primary stage there is heat abstraction, but in non-febrile cases this is followed by increased heat production and accumulation due to the prevention of heat elimination. With reaction heat equalization takes place, with increased heat loss. With this increase of heat and the warming of the sheet, the temperature generally rises sufficiently to produce perspiration. The thermic action is intense and the caloric response, like the circulatory, depends solely upon the patient's power to respond, and it was probably for this



PLATE 80—Half Wet Pack



PLATE 81—Hot Blanket Pack

reason Priessnitz gave his packs early in the morning, before patients left their beds, while there was an accumulation of heat in the skin. If heat abstraction or antipyretic effect be desired, the packs, according to Liebermeister, should be repeated every ten minutes until five are taken. I do not consider the pack valuable as an antipyretic measure, much preferring the full bath or sponge and compress.

Upon the *nervous system* its action is marked. The first peripheral impression is a powerful one of discomfort and nervousness. With the onset of reaction comfort returns, after a short while the nervousness disappears, a sense of quiet and calm takes its place. The warm vapor bathes the peripheral nerves, renders them more succulent, less sensitive, and this is aided by the absence of any mechanical irritation. With the withdrawal of blood from the viscera, brain, etc., to the surface, drowsiness and later sleep are commonly produced, as central innervation dependent on the active blood stream will be lessened, though this is due to a combination of factors. The wet pack makes an appeal to every nerve in the skin and to all the various functions of the nervous system. The blood circulates in increased volume and under increased pressure through the nerve centers, and "in consequence, the acid fatigue products, which had been maintaining a permanent excitement of nerve elements, can be completely removed; the immediate subsequent diminution of the blood supply effected during the second part of the pack, cannot fail to be a great advantage, for it lowers the functional activity of the nerve tissues that has been unduly prolonged, and brings them, therefore, into the condition which is a necessary preliminary to the beginning of nutritive assimilation. The diminution of the blood supply is not sufficient to interfere with this latter process, for it is not below the point which exists in sleep." (Jacobi.)

Upon *tissue change* the pack has a decided alterative effect, all organic processes being vigorously excited to action. The heat abstraction by the cold induces functional activity; with reaction and with temperature elevation there is a considerable destruction of toxins, together with elimination of waste tissue products. Proteid destruction and oxidation take place, the nitrogenous output being much increased. The neuro-vascular activity favors nutritive assimilation in the various tissues, and it is probable that auto-toxins are consumed in the powerfully enhanced combustion which represents the fever process, and that they are thus eliminated from the organism. "The so-called curative power of fever probably is due to this oxidation of toxins and auto-toxins, and it may also be the reason why sometimes chronic diseases are removed by acute intercurrent diseases, and why many individuals feel much better after acute febrile diseases."[1]

1 Kellogg, J. H.: "Rational Hydrotherapy," p. 608.

Upon the *muscular system* the pack produces primarily contraction, most marked in the muscular tissue of the skin, causing goose flesh. There is rigor and tremor during the cold stage, but later this gives way to muscular relaxation and lessened muscular irritation. Mosso, Maggiora and others have shown that the wet pack increases muscular activity and tonicity, and this explains the increased strength felt after the pack. Their tables showed marked improvement of lifting power.

Upon the *blood* the pack not alone moves the stream through the blood-vessels more actively, but by causing increased elimination purifies it of many detrimental toxins and much waste material. It increases the oxygen-absorptive power of the red cells and the hemoglobin. Its bactericidal powers are enhanced, owing to the greater number of leucocytes. After a wet pack the blood stream is richer both in hemoglobin and all corpuscular elements, thus explaining its value as an adjunct to iron in the treatment of depleted blood states.

Therapeutics of the Wet Pack.—If the aim be antiphlogistic, the pack must be administered at about 60° and repeated every ten minutes until the effect desired is attained, Liebermeister having shown that five such packs are equivalent to one Brand bath executed with every attention to detail. The wet pack at 60° F., like the full bath, is not administered with the *sole* idea of *reducing* temperature, but finds its *greatest* indication outside of its thermo-reducing value. That the full wet pack is a powerful tonic, an eliminator of toxins, a stimulator of renal and cutaneous activity; that it tones and refreshes the nervous system, steadies and improves cardiac action, is daily observed. In acute nervous affections; in the restlessness of alcoholism, morphinism and other drug addictions, the wet pack serves as a calmative and sedative of very great value, and it is to be regretted that the general practitioner under whose care these conditions most frequently present themselves does not avail himself of a method the value of which remains undisputed and the technique of which is not difficult to acquire. An added incentive is the fact that all methods of *drug* medication will be enhanced and their physiological action more nearly attained.

In chronic diseases the wet pack, because of its physiological action upon the nervous system, is most valuable. The author has found it a satisfactory remedial agent in the cure of insomnia, and uses it most frequently just before retiring. In all the functional psychoses and neuroses, especially neurasthenia, the wet pack, followed by active hydratic methods, is of value, though I prefer other methods where the patient is up and going about. Where the nutritive forces are *low*, where secretion and excretion are diminished, the pack will serve a useful purpose. In these cases it will be noticed from day to day that reaction is more and more prompt,

showing greater activity of neuro-circulatory response. In anemia, chlorosis and digestive disorders the pack can be used, but it is better to educate these cases to its use by a preliminary training with the wet sheet. The wet pack should be followed by some cold application—sheet bath, half bath, cold ablution, rain, jet, etc.—to restore tone to the cutaneous blood-vessels, and a proper selection can be made to meet the patient's needs and conditions.

The only contraindications to the use of the pack are great feebleness, a very weak heart, vascular disease and some skin diseases.

The Half Wet Pack.

The half wet pack is a very useful procedure, especially where abdominal and pelvic conditions are to be met. It is easily applied as follows:

Fold a blanket so that it will extend from the axilla to ten to twelve inches beyond the feet. Place the blanket across the cot or bed; fold a coarse linen sheet to come within two inches of the upper and lower ends of the blanket. Now wring the sheet out of water at from 50° to 70° F., spread same on the blanket (see cut) and have the patient lie down on it so that *the upper edge of the blanket* reaches the axilla. Rapidly draw the sheet around the trunk, tucking it well under the body on either side and enveloping the legs as in the full pack (see cut). Likewise apply the blanket, being sure to draw the *edges* very tight. Cover the patient with bed clothing and apply a cold wet turban, cold water cap, or cold circular compress to the head or neck (see cut).

The immediate and secondary effects are similar to those of the full pack, but less in degree. Patients react much more quickly than in the full pack, and it can therefore be more extensively and frequently used. Its physiological action is similar and need not be repeated.

Hot Blanket Pack.

In some instances, where we wish to apply great heat to the entire body in the form of a pack, we may substitute for the sheet a blanket wrung out of very hot water, 120° to 130° F. (see cut). The method of its application is then the same in every particular as the full wet pack, the aim being in this instance to retain all the heat possible. If desired, the blankets may be finally covered with a rubber sheet.

The Dry Full Pack.

This simple procedure is comparatively little used, owing to more valuable methods of securing the same results. The aim in the dry pack is to produce sweating, the excitation of perspiration being brought about by heat retention, the rough and irritating surfaces of

the blanket serving to stimulate cutaneous hyperemia. This pack may be applied upon a bed or couch. Two blankets are first warmed and then spread upon a couch or bed, and upon these the patient reclines entirely nude. The upper left edge of the inner blanket is now carried *under* the *left arm*, *over* the *body* and tucked under the *right side*; then the right side is carried *over* the *right* arm, *over* the body and *over* the *left* arm and tucked under the left side. The left lower edge is carried over the patient's left leg and *under* the right leg. The right edge is then carried over both legs and tightly and snugly tucked under the legs. The bottom is closely folded from *above downward* and placed under the feet, where it is held by their weight. The second blanket is similarly applied. A towel is tucked around the neck to secure comfort. The patient now resembles a mummy. Additional blankets should be used to cover him thoroughly. Care must be exercised to prevent "air currents," and the patient should be instructed to be still. If the blanket is pulled very tight comfort and freedom from muscular fatigue will be secured; if loose it is apt to make patients nervous and produce tickling. A hot-water bottle to the feet hastens perspiration. A cold cephalic compress prevents retrostasis. The blankets must be aired and kept clean and dry.

Physiological Action of the Dry Pack.—The first effect of the blanket, if tightly and correctly applied, is to produce muscular relaxation. The woolen strands irritate the skin. The blood-vessels of the skin dilate and the body is warmed. The skin becomes reddened, and as heat elimination is prevented it accumulates on the surface and shortly thereafter perspiration commences. As in other heating procedures, the pulse at this stage is accelerated, the head is apt to feel full and a sense of discomfort is felt. With the outbreak of perspiration the pulse becomes slower and the patient more comfortable. The time necessary for these phenomena varies, but is usually uncomfortably long to the patient. The duration may be lessened by a preliminary heating, by hot-water bottles around and under the extra covering. The dry pack is simply a preparatory procedure, and when used alone has little, if any, therapeutic indication. It may prove useful in promoting reaction in those who fail to respond to active cold methods.

In connection with the electric light bath and fomentation, in sciatica, it has proved in my hands of some value as a protective during the application of the fomentation. It should always be borne in mind that in this, as in all procedures having for their object the heating of the surface and the production of perspiration, it must be followed by a heat-depriving measure, adapted to the heat accumulation and the patient's reactive power. A sensitive vasomotor system, cerebral determination, in cutaneous hyperesthesias, in skin eruptions and in the very nervous, it should not be used.



PLATE 82—Foot Bath.

The half dry pack is limited to the trunk in its use, and extends from the axilla to the hips, the extremities being free. It is applied snugly to this region, and is employed for gastro-intestinal disorders. It has little value.

Of all the measures used to prepare patients for hydriatics, the dry pack possesses the least value, and should not be used when there are other and more satisfactory methods at hand. It is slow, disagreeable and inefficient.

Local Baths.

The hydriatist is apt to describe in much detail the many local baths, hot, cold and neutral, of which we may mention the hand, arm, elbow, leg, foot, etc., as the principal ones. Their effects are similar, and differences that exist are due to anatomical rather than physiological changes, for they are in their *finality* limited to local and derivative action. As a *type* of this class we shall only describe the most frequently used one, viz., the hot and cold foot-bath.

Foot-Baths.—The tub may be of wood, metal or porcelain, preferably of the latter. It should be of sufficient size to admit feet of good-sized caliber without cramping, and yet at the same time permit some freedom of movement. In the arrangement of this tub, modern attachments must be used that will permit of the entrance of water from below, either between the feet or from the end toward which the toes are turned.

In the use of the *hot foot-bath*, the tub is filled to the depth of four to five inches, or, if further derivative influences are sought, it can be filled so as to embrace the leg. The initial temperature should be about 104°, this being rapidly raised to the point of tolerance, so that by the end of two or three minutes the water has become as hot as 115° to 120° F. The duration ranges from five to thirty minutes. Its action may be slightly enhanced by moving the feet about slowly. As the water cools, more should be added to maintain the temperature. It is desirable to retain the blood in the parts and secure tonic dilatation; for this reason the foot-bath should be followed by a very brief *cold* application, such as a quick immersion in cold water, a pail dash or a cold spray, thus securing reaction.

The local and general effects are those of the hot full bath, limited to the pelal extremities, which effects have been fully described. The hot foot-bath is a much-used family remedy in the treatment of incipient inflammatory troubles of the respiratory mucous membrane. It is also a derivative of no mean value in removing blood from the pelvic, rectal and lower abdominal regions, stimulating the involuntary muscular fibers of these organs as well. In painful conditions of the feet, sprains, bruises, myalgia and neuralgia, these baths afford temporary and sometimes permanent relief where they are used fre-

quently. The so-called "fullness of the head" from which neurasthenics suffer is temporarily relieved. In certain surgical injuries, as ulcers, felons, burns, etc., the foot-bath, at moderate or neutral temperatures, fills a useful niche.

The *cold foot-bath* is applied by means of the same tub at temperatures ranging from 50° to 60° F., its duration ranging from one to five minutes. It is much less frequently used than the hot foot-bath, although it is not an infrequent application. It will be found that the effect of the bath is greatly enhanced by a short primary immersion of the feet in warm water. The patient should be instructed while the feet remain in the bath to chafe them constantly by rubbing one foot against the other.

The physiological action of the cold foot-bath is in general that of the cold full bath already described. Its revulsive and reflex effects are more extensive than those of the hot foot-bath. The action of the cold foot-bath is locally tonic, acting with especial selection upon the pelvic and lower abdominal viscera. By reflex action it causes contraction of the unstriped muscular fibers of the various organs and blood-vessels contained in these areas, and especially the muscular tissue of the uterus and bladder. Where the rubbing of the feet is maintained constantly during its application, it acts as a derivative upon the cerebral circulation, lessening the quantity of blood therein. This is equally true of local applications made to the hand and wrist, it being an interesting fact that the immersion of the hands in cold water will stop nose bleed, and during the heat of summer will do much to lessen the quantity of blood in the brain, as well as reduce temperature. It has been a frequent observation of the author's that the sudden application of cold to the feet will promptly cause an evacuation of the bladder, a fact that has been utilized by him when unable to secure a catheter. The very cold foot-bath of short duration is a most excellent measure for relieving persistent cold and sweating feet, in which cases it should be administered at a temperature of 50° F. for one minute. In cases of insomnia, where they have been of short duration, and largely brought about by deficient circulation, this bath may be of some help, but my experience has been that such cases demand more extensive general procedures. One should be careful to avoid administering the cold foot-bath when any inflammatory trouble of the pelvis, bladder or rectum exists. It should be remarked that localized conditions, such as chronic rheumatic troubles, neuralgia and some cutaneous diseases, forbid the use of this bath.

It is interesting here to note that one of the most popular "fads" of recent years has had to do with the local application of wet cold to the feet and ankles. I refer to the so-called "Father Kneipp cure." This method came somewhat into vogue with certain fashionable, in-

active and over-fed people, who were prone to attribute the good results obtained to walking through the grass while still wet with the morning dew. They seemed to ignore the fact that they were upon reduced rations, coarse food, and taking active exercise in the open air. They doubtless derived some benefit from the application of cold to the pedal extremities. Like most fads, it had its day, being literally "run into the ground."

The Sitz or Hip Bath.—This is a very valuable local hydriatic measure that has been in use for a long number of years. The sitz bath may be administered by means of a sitz bath-tub made of metal or porcelain, the latter, of course, being preferable. The sitz tubs upon the market at the present time are all that could be desired by those contemplating their purchase. It should be of such size that the patient can comfortably sit in the tub with the feet hanging out, and be provided with modern arrangements for the introduction of hot and cold water from the bottom. The rim should be broad enough so that there will be no necessity to flex the limbs and compress the popliteal space, for where this is done the circulation in the lower limbs is interfered with materially. Where the individual is short of limb it makes the bath more comfortable to have the feet supported. The tub should be filled with water of the proper temperature desired for the application to such a depth as will reach the level of the patient's umbilicus. During the use of this bath the upper trunk should be protected by some covering, either in the shape of a Turkish sheet or undervest, to prevent chilling. The patient must semi-recline with the back resting upon the back of the sitz tub, the limbs separated so that the lumbar, lower abdominal regions, outer and inner surface of the thighs, the perineum and external genitals are brought in contact with the water. When the cold sitz is employed the head should be covered with a cold towel or wet turban, and this may likewise be used during the hot sitz, although it is usually not required.

The Cold Sitz Bath.—This bath is not only a valuable local application, but influences more or less all bodily functions. During its administration the attendant and patient should rub the external surfaces in contact with the water, in order that the frictions may stimulate the cutaneous blood-vessels to dilate. This bath is usually administered at temperatures from 80° to 50° F. for five to fifteen minutes, according to the effect desired. It causes a contraction of the cutaneous blood-vessels of the area covered by the water, and from which the column of blood is driven inward; this effect seems especially felt in the head, and may on certain occasions, as the author has demonstrated on his own person, be used to increase cerebral activity. This in practice calls for a cold turban or ice-cap to prevent the unpleasant feeling of fullness. With the application of friction the blood-vessels begin to dilate and a slight rosy hue is produced in

the skin. With the dilatation of the peripheral blood-vessels under friction the column of blood is again directed toward the periphery and maintained there, and this maintenance of the blood in the skin acts as a tonic, and is in no sense a vascular paresis. The *heart's* action becomes stronger and better, the *pulse* slower, increased in volume and arterial tension raised. *Temperature* is reduced in the parts immersed, which will be compensated if the bath is of moderate duration. When reaction takes place, local temperature is elevated. If long continued a systemic reduction may take place.

The influence of this bath is probably greatest upon the *nervous system*. The thermic impression rising from the impact of cold upon the surface is conveyed reflexly to the anatomically related areas in the pelvis, lower abdominal regions, and reflexly upon the whole of the spinal, central and sympathetic nervous systems. It stimulates the peripheral nerve endings, increasing their dynamic influence in no small way. Upon the spinal and sympathetic centers that preside over the genito-urinary apparatus this bath has a wide influence, brief applications toning and stimulating these structures. Owing to the intimately correlated relations between the abdominal viscera and the skin of the lower abdomen and hips, we may by this bath so increase and improve the intricate chemistry of digestion and assimilation as to improve general *metabolism*. It is a clinically observed fact that functional activity in these organs is much enhanced. Upon the *muscular* structures related to the bath, directly and reflexly, the cold sitz acts as a tonic, improving the power of contraction in the various viscera of the pelvic and lower abdominal regions. This is especially true of the functions of defecation and urination, upon which these baths possess potent power. The muscles of the abdominal wall and muscular ligamentous structures supporting the pelvic viscera are toned and strengthened by this application. It increases the *elimination* of waste products through the kidney and stimulates the outflow of bile, probably because the portal circulation is much increased and its tension raised.

The *therapeutic application* of the cold sitz bath is extensive, it being a powerful tonic to local functions. Where the muscular structures of the urinary bladder are weak or paralytic in adults, and especially children who suffer from nocturnal incontinence of urine, the brief cold sitz is indicated. In weakened sexual power, with general loss of tone, in spermatorrhea, prostatorrhea, chronic congestions of the vesicles and prostate, this bath at 60° to 70° F. for ten to fifteen minutes will prove of signal benefit. In diseases of the pelvic organs in the female, where they are dependent upon low-grade chronic inflammation, relaxation, lack of tone, congestion, etc., where no pus is present, this procedure will prove tonic and stimulant in their relief.

In profuse menstruation Baruch[8] says that in those cases which "drag on from month to month, the patient exhausted and anemic, and thus establish a vicious circle which maintains the drain, when curetting has failed or is not indicated, the flow being maintained by a feeble local and general circulation, hip baths of five to eight minutes, in water at 85° F., with constant friction, followed by affusions or preferably by the circular bath and then douches at the same or a lower temperature, far excel all medicinal agents. It is the author's custom in such cases to order the hip baths on the fifth day of the menstruation, when the latter arrives at a distinct period, and to continue it daily until the flow has ceased. If no distinct period exists, the hip bath should be ordered after the flow has become profuse, and it should be continued until the flow ceases. Not only will the drain be thus checked, but the tonic effect of such a bath will counteract the depreciated systemic condition and restore the patient's health and spirits. Most women object strenuously to the cold hip bath in menstrual disorders. It is therefore wise to forestall their fears by reassuring them of the necessity and great value of brief hip baths in these conditions." In diarrhea, dysentery and all inflammatory diseases of the small intestines, colon and rectum, the author has found the method of Winternitz the most satisfactory. The patient is given a dripping sheet, as heretofore described, followed by a cold sitz bath for ten to fifteen minutes, commencing with a temperature of 85° F. and gradually reduced to 60° F. Some cases do better at 70° rather than 60° F. The patient and attendant should be made to persistently rub the abdominal walls during the administration of the bath. Its action is to stimulate the sympathetic nerves, diminish peristaltic action, lessen secretion and contract the intestinal blood-vessels. In jaundice, where the duct is open, in those who suffer from chronic deficiency of biliary secretion, the bile may be augmented through the use of this bath. Because of its muscular effects the cold sitz (50° to 60° F.) for five to seven minutes will overcome constipation. Where there is a therapeutic indication for an increased quantity of blood to circulate in the brain we have in the cold sitz bath a method of driving the blood to this structure.

The cold sitz bath is contraindicated in all irritable and painful conditions of the abdominal and pelvic organs; in acute inflammatory states such as cystitis, ovaritis, cellulitis, etc.; in pus formation; in all forms of muscular spasm; in profuse uterine hemorrhage, and in acute inflammations of the rectum.

Certain modifications hardly worthy of a distinct consideration consist in the employment of the so-called tepid sitz bath (68° to 86° F.) for twenty to thirty minutes, it possessing some antiphlogistic power. In certain painful affections of the pelvic viscera, lower

[8] Loc. cit., p. 222.

abdominal region and rectum the use of the alternating sitz is valuable. They may be either administered as a hot sitz (110° F.) for ten minutes, followed by a short dip in a cold bath (60° to 70° F.) for a few seconds, or we may reverse the procedure by a short dip in a cold sitz followed by a five minutes' immersion in a hot sitz. The indication for the use of these measures will be found to be rare.

The Hot Sitz Bath.—This is administered at temperatures ranging from 104° to 115° F., somewhat higher in special cases. Its duration ranges from three to fifteen minutes, a fair average being about ten minutes. Most patients object to the immediate immersion of even a portion of the body in water at a temperature of 104° F. or higher, and for this reason it is well to commence the use of the bath with a temperature of 100° F., rapidly adding hot water until the maximum temperature is reached. This will be an easy matter in those modern sitz tubs where the water enters the tub from the bottom. In the use of the hot sitz bath additional derivative effects may be obtained by the use of the hot foot-bath.

The physiological action of the hot sitz bath is that of a localized hot bath. The hot water causes an atonic dilatation in the cutaneous blood-vessels, especially those of the external iliac artery, brought about both by its direct and reflex action, the skin becoming reddened and intensely congested as paralysis of the vasomotor constrictors takes place. With this intense dilatation the quantity of blood in the pelvis is largely increased, the major portion being drawn from the area of the portal, although quite a good deal of blood comes from the general circulation. There is a noticeable increase in the pulse-rate and a slight diminution in blood pressure at this time. *Temperature* is elevated, coincident with which we find general perspiration, with increased local action of the glandular structures of the skin in contact with the water. *Metabolism* is enhanced, nitrogenized products being more rapidly oxidized into urea. The glandular structures of the pelvis are stimulated and discharge more freely their mucus. Upon muscular tissue brought under its influence it has a decided quieting, relaxing and antispasmodic effect. Upon the *nervous structures* anatomically related, it is a sedative of high value, reducing the number of impressions that arise from the periphery, owing to its heat and the more succulent and sedative condition of the cutaneous nerves. Pain and spasm are diminished and relief obtained. Its physiological action points clearly its use.

The *therapeutic application* of the sitz bath has been known for many years, and is in many households a family remedy. It has probably been more frequently used and proven of greater service than any other hydratic application in the restoration of painful and suppressed menstruation from whatever cause. In this condition it not only checks the pain and spasm that is present, but by materially



PLATE 88—Hold Bath



PLATE 89—Affusion to Back and Spine

increasing the quantity of blood in the pelvis favors bleeding, and therefore immediate relief. In its use care should be taken to prevent chilling afterward, and for this reason it is best administered just before bed-time, its action being maintained upon return to bed by the use of the hot-water bottle, etc. In the painful tenesmus of vesical catarrh of whatever origin, it is a remedy that will at once bring relief to the sufferer. Where there is retention of urine and inability to introduce the catheter this can frequently be accomplished and relief gained by introducing the instrument during the application of the sitz bath; the water should be as hot as can be borne. In anal tenesmus, in inflamed hæmorrhoids, in vaginismus, in various neuralgias of the ovaries and external genitalia, the hot sitz bath is an excellent analgesic measure. Where these latter conditions do not depend upon inflammatory conditions a very brief application of cold, such as an affusion, will enhance and lengthen the influence of the bath. In all forms of pelvic trouble where we desire a relaxing, antispasmodic, sedative and anodyne influence, the hot sitz bath will meet the indications.

The Half Bath.

This bath is administered in an ordinary bath-tub, which should be of sufficient length to permit of the patient's sitting comfortably with the limbs extended. The best tub is a porcelain-lined one, and should, in use, be filled with water that reaches to the level of the umbilicus. The temperature at which it is usually administered ranges from 85° to 50° F., although the latter is very rarely used. A fair average is from 75° to 65° F. Always commence with 85° or even 90° F. and reduce the temperature two or three degrees daily until the desired point is reached. The tub is first filled to the proper depth and an ice-helmet placed on the patient's head, after which he steps into the tub and sits with the limbs extended, the attendant standing on the patient's right side, leaning over to apply the friction. During the bath the patient dashes water against the chest and arms, applying friction, while the attendant either dashes water from the tub against the back and sides with one hand while he applies friction with the other, or dashes water upon the patient from pails that stand beside the bath-tub. The author's experience has led him to use the following method, which he believes is superior to the usual one of giving the half bath: As soon as the patient seats himself in the tub, the attendant at once commences to chafe the surfaces of the lower limbs, spending approximately one-half minute upon each limb, while the patient applies friction to the lower abdominal wall and buttocks. The attendant then moves to the back, and with the left hand dashes water from the tub upon the back while he applies friction vigorously with the right hand, the patient in the meantime splashing water upon

the chest and arms, rubbing them as vigorously as he can. This should occupy about two minutes; the time may be lengthened proportionately to the duration of the bath.

The duration of the bath should range from two to five minutes, at the end of which time the patient receives an affusion, over the back and shoulders, of water several degrees colder than that in the tub. He is then lifted or steps out, and is rapidly rubbed down with Turkish towels until dry and good reaction obtained. Exercise may then be taken if indicated.

The Physiological Action of the Half Bath.—This powerful tonic and stimulative measure more nearly resembles the douche than any method that does not employ apparatus. In general practice it may be used in place of the douche, and should take precedence over the much-abused "plunge." The repeated splashing of the water upon the skin surface, and the friction, influence the vascular state profoundly. With the first contact there will be a contraction of the surface tissues, paleness and lessened blood-supply. There is a gasping respiration, sense of constriction and discomfort. As soon as the friction is applied the column of blood comes to the surface and fills the tonically dilated blood-vessels, which further dilate when reaction takes place. There is practically no heat abstraction, owing to the brief duration of the bath. Respiration is deepened, with better exchange of gases; all phases of metabolism enhanced, and muscular power increased. It is a powerful tonic stimulant to the nervous system through the thermo-mechanical impressions made by the cold water and friction, and especially influences the functions of the spinal cord. For greater detail of these effects, the reader should peruse the section in which is detailed the physiological action of the douche.

The *therapeutic application* of this bath is wide. As a substitute in private practice for the douche, it becomes useful in all those chronic diseases in which circulation, metabolism and nerve force need regeneration. The author has found this bath of unusual value in chronic organic diseases of the spinal cord, especially in cases of locomotor ataxia, chronic spinal meningitis, chronic myelitis and similar affections. In these diseases it is customary to use the half bath for two to five minutes, commencing at a temperature of 80° to 85° F., gradually reducing the temperature of each succeeding bath until 70° or 65° F. is reached. The friction should be well applied, strong enough to bring about a reaction in the bath, and sufficient to make the patient feel fairly comfortable. In the diseases mentioned, pain is usually a contraindication for its use, but I have seen good results follow these baths even when marked lancinating pains were present. The author has used with the half bath pine extract, mustard and other stimulating measures, but has never found them of any additional value, and now rarely employs them. Strasser has found the half

bath, at 65° to 70° F., for six, gradually increased to fifteen minutes, of service in the treatment of *febrile* and infectious diseases, for where it is sufficiently prolonged (fifteen minutes) and friction continued, it abstracts heat, strengthens the heart and overcomes circulatory weakness, arouses and tones the nervous system, lessens muscular weakness, favors metabolic changes and provokes diuresis. The author prefers either the sponge and compress or the full bath. In respiratory diseases, in hypostatic congestion, in bronchitis and other affections, the patient should be placed in a half bath at 90° F., and held in a semi-recumbent position by one nurse while another bathes the upper part of the body, and especially the chest, with water at 50° to 60° F., or gives an affusion to the chest (see cut) at the same temperature. It will arouse, stimulate, and relieve even desperate cases. In anemia, chlorosis and other depraved blood states, it not alone increases hemoglobin and corpuscular richness, but causes the system to rapidly utilize iron, which had before seemingly been of little avail. It may be employed after the use of heating and sweating procedures in a similar manner to the douche. For this purpose it is popular with foreign hydriatists, although in this country the douche is much preferred. In neurasthenia, in the functional neuroses and psychoses, in the gastric disturbances, constipation and autotoxemia accompanying them, the half bath will be found an excellent measure.

The *hot half bath* is rarely employed by the author, the indications for its use being better met by the full hot bath or the hot sitz bath. One can vary the hot full bath by making it at first a hot half bath, if it is so desired.

The cold half bath is *contraindicated* in acute inflammations of the abdomen and pelvis, in profuse uterine hemorrhage, in suppurative states in the pelvis, in painful nerve lesions of the lower extremities, in acute inflammations of the heart muscles and its membranes, and in acute inflammations and congestions of the central nervous system. It must be used with care and judgment in thoracic diseases.

CHAPTER X.

THE TECHNIQUE OF HYDROTHERAPY.

(Continued.)

The Very Hot and Hot Bath.

THESE baths may be administered in an ordinary porcelain-lined tub of considerable breadth and fully seven feet long, in which the average patient can recline comfortably and yet have the shoulders well covered. A strap across the "head" of the tub can be arranged to support the patient's head, though this is not absolutely necessary. The water should enter at the "foot" of the tub from below, which is easily accomplished by the modern faucet arrangement. The temperature of the *very hot* bath ranges between 104° and 110° F. for Europeans and 130° F. for the Japanese; the *hot* bath ordinarily varies from 100° to 104° F. The difference of action physiologically between very hot and hot temperatures is one of degree. The Japanese can stand temperatures that are extremely painful to Europeans, but, as they have become habituated to these temperatures from youth, it is not surprising that they excel the "white man" in thermic capacity. There is a popular idea prevailing that the very hot bath is productive of diminished power of resistance, but this is disproved by the daily labor, capacity for endurance, and other wonderful traits exhibited by the Japanese. Too high a tribute cannot be paid to these people for their intelligent use of bathing and for their great personal cleanliness. The bath should be administered as follows: The patient's face and neck having been bathed in cold water, with cold compress or ice-helmet upon the head, he steps into the tub and reclines in water at 100° F. After the first *momentary* discomfort, the water should be rapidly raised to the temperature desired by the addition of hotter or very hot water. The duration of the bath ranges from two to ten minutes, being governed by the patient's condition and peculiarities. Friction during the bath in certain conditions is of value, aiding circulatory effects.

Physiological Action of the Hot Full Bath.—The first impression of very hot water upon the body surface is similar to that of cold, producing shivering, a sensation of pain and transient discomfort. This effect is of short duration, and is followed by relaxation and a sense of warmth. Its effects upon *circulation* are marked, the blood-vessels being first constricted and later dilated—in fact, becoming

much distended with blood. The heart's action is increased, the pulse rapid and feebler as the temperature is raised, but tone is not altogether lost, this being more noticeable after the bath than during its administration. The skin is red, owing to the dilated cutaneous blood-vessels, the increased quantity of blood called to the surface being fairly proportional to the temperature of the bath. The internal blood-vessels are contracted through diminished quantity of blood and from reflex action.

During its administration vascular tension is at first slightly raised, but is lowered immediately after reaction in and following the bath. *Respiration* is quickened and its depth lessened; CO_2 elimination increased but oxygen absorption diminished. The *temperature* of the body is markedly raised by heat absorption and the prevention of heat elimination. The increased quantity of blood in the peripheral blood-vessels, unable to lose its heat, returns to the center of the body and raises internal temperature.

Upon tissue change its action is spoliative, tending especially to break down lowly organized and inflammatory deposits. Upon *muscular tissue* it is a powerful relaxant, relieving spasm and pain. It has an agreeable and soothing influence upon overstrained and tired muscles, which is believed to be due to its destroying the toxic products of fatigue by increased oxidation. In like manner it acts as an *eliminant*, destroying many toxic materials in the blood by its increased temperature and removing them from the body by subsequent diuresis. Upon the *nervous system* its action is primarily that of a powerful stimulant. The first impression is of discomfort and in a certain sense pain, but this is shortly followed by a feeling of comfort, relief from pain, and general relaxation. The thermic impressions traveling inward from the periphery set up reflex influences, especially of a vasomotor nature, with a resultant vascular dilatation. The brain and cord soon become anemic, as evidenced by a slight drowsiness, and, as shown by Schuller, a sense of cephalic pressure and a vertigo on rising from the bath.

Prof. Baelz, of Tokio, has made accurate observations on the hot bath. Residing among a cleanly people, with whom hot bathing is a daily practice, there being four hundred thousand hot baths given daily in Tokio alone, he had exceptional opportunities for studying their effects. The temperature adopted by the Japanese is usually about 130° F., while Europeans indulge in baths of 104° to 109° F. The head is usually first bathed in hot water before the bath is entered, in order to relax and dilate the cerebral vessels, and thus prevent cerebral anemia when the cutaneous vessels become greatly dilated. This is also aided by the sitting posture usually assumed. Palpitation, oppression and a decided sense of great heat are regarded as a signal for removal. The first effect of such a bath is usually pallor and goose skin,

lasting a few seconds; the pulse becomes slower, and afterward more rapid. At first the respiration is not much affected; later it becomes more rapid and purely thoracic. The temperature of the body rises slowly to 104° and over, this effect being due to heat retention combined with direct absorption. It occurs rapidly, often within six minutes, but it returns to normal in half an hour after the bath. The arteries become relaxed, the temporal artery assumes a dendritic form, as in arterio-sclerosis. The pulse is full; its curve is high. Prolonged stay in the bath produces vertigo and nausea. The consumption of albuminoids is not increased by the hot bath. On leaving the bath abundant perspiration ensues. The Japanese apply cold affusions before leaving the bath. Many suppose that colds are easily taken after hot baths. According to Baelz, this is impossible. While a warm bath relaxes the vasoconstrictors, and thus predisposes to cold, the very hot bath produces a paralysis of the cutaneous vessels, which lasts some time and prevents their contraction when exposed to cold; the Japanese often run naked on the streets after their hot baths without taking cold. Such a bath produces no tenderness and debility, but seems to stimulate and tone; but there is usually a slight loss of weight after continuous use. The sense of warmth produced by the Japanese hot baths is claimed to be so enduring that it is regarded as an economical method of keeping the body warm in winter in dwellings which are not heated. The baths at Kusatu are natural thermal waters of a temperature of 123° F., and are much sought by the Japanese. In these natural thermal baths the temperature usually ranges between 119° and 123° for the bather.

Upon removal from the very hot bath the skin continues to remain red for quite a time, depending somewhat upon the individual and his peculiar reaction. From the hot bath a partial atonic reaction takes place, followed by sweating, which, if desired, can be enhanced by a dry pack, retaining, as it does, the heat on the surface. The pulse remains quickened, and with the cooling process gradually returns to the normal. As stated above, there is a popular theory that persons are liable to cold after a very hot bath. This is untrue, for the blood-vessels remain dilated for quite a while and do not react to cold. As we shall see, this is not the case with the warm and tepid bath.

Therapeutics of the Hot Full Bath.—These baths have obtained a world-wide reputation in muscular and chronic rheumatism. They are the ones mostly employed at saline and sulphur thermal springs, and have given these springs some renown in such cases.

The daily use of the very hot full bath at 106° to 110° F. for ten minutes, together with rubbing and manipulation of the affected parts during the bath, is the method most frequently employed. In acute alcoholic delirium (delirium tremens), in infantile and other

convulsions, in cerebro-spinal meningitis, they have been employed with success. In acute nephritis and dropsy, especially the nephritis of the acute infectious diseases (scarlet fever, measles, diphtheria, etc.), it will be found capable of major service. In the acute nephritis of adults the author has abandoned its use for the safer and more satisfactory action of superheated hot air. Baelz found it of especial value in bronchial pneumonia and capillary bronchitis in children, relieving the congested lung and easing cough when the bath was given at 104° F. for five or ten minutes, two or three times in twenty-four hours.

These baths are contraindicated in some cases of arterio-sclerosis, in cardiac disease, tabes, myelitis, spinal and cerebral organic disease and febrile states.

The Warm Full Bath.

This bath is administered in an ordinary tub, which should be of sufficient length to permit of the patient reclining comfortably, the tub being so filled as to cover the shoulders and body. The temperature ranges from 96° to 100° F., never higher than the last-named figure. Should the temperature of the water decrease, more hot water may be added to keep the temperature up to the indicated degree. The bath is given as follows: The patient's head and neck having been first bathed in cold water, with a cold compress or ice-cap upon the head, steps into and reclines in the water. The temperature of the bath is such as to be pleasing and cause no discomfort. The duration varies with the object in view, ranging from five to thirty minutes. Friction is not used in the bath. Its physiological action is exerted principally upon the nervous system. Upon peripheral nerves we have the statement of Hyman, Klebs and Kollicker that cutaneous terminations become more succulent, and as a result are blunted, receiving and transmitting fewer impressions, for if a nerve is laid in warm water for a short time it becomes somewhat less irritable than when a nerve is exposed to the air, while protected from desiccation by evaporation. Upon the brain and cord it has been shown by Max Schuller to cause a contraction of the pia matral blood-vessels, which was sustained for a long time. As a result, the brain sank in the rabbits he trephined, but after a return to normal conditions the animal's brain showed a much increased pial circulation. This is borne out by experience, and the writer has time and again tested the same clinically upon his own person, the bath producing drowsiness and sedation. Its well-known action in irritable and convulsive states needs only to be recalled to accentuate this fact. The cutaneous blood-vessels are neither dilated, as in the very hot bath, nor is there the tonic reaction following cold measures, so extra precautions must be taken to avoid "taking cold." The atonic reaction

following the bath is usually accompanied by increased perspiration, the evaporation of which will chill the patient; for that reason the room should be of a proper temperature, the patient quickly but thoroughly dried, protected from draughts and allowed to stir around as little as possible. When the skin has been well dried, place between cotton sheets, carefully cover, putting a hot-water bottle to the feet. The hair must be thoroughly dried, and, if necessary, a dry turban placed around the head, made by folding a towel as previously described.

Therapeutics of the Warm Full Bath.—The warm bath has been used to allay restlessness and reduce pyrexia.

"Eross reports the results of his observations upon the use of antipyrine, quinine, and warm baths in the pyrexia of very young infants. Among 431 cases of fever during the first ten days after birth, 145 were of short duration, the remainder continuing for several days; in 184 it was continuous, and in most of the others irregular. In 44 per cent. it was attributable to gastro-intestinal disorders, in 34 per cent. to some disorder connected with the navel. Antipyrine was given in doses of from one grain to two and one-fourth grains, repeated, if necessary, in an hour. The effect was good, as was that of quinine. *Better results were obtained from warm baths than from either drug.* The temperature of the baths was 98°; duration, ten minutes; in weakly children, five minutes. Upon the general condition the result was very satisfactory. Sleeplessness and irritability usually disappeared, and the child fell into a quiet sleep, from which he awoke apparently improved. When the temperature is very high, a warm bath is an agent of the greatest value.

"Wollisch reports seven severe cases of cerebro-spinal meningitis. The entire course of the disease was rendered mild by these baths. The favorable influence on the heart and nervous system was well marked. The baths were administered in a somewhat different manner from Aufrecht's method. The patient was put into a bath of the temperature of 90°, and gradually hot water was added until the temperature of the water reached 102°. During the bath the ice-bag or Leiter's coil was applied to the head.

"The transportation from the bed to the bath should be conducted most carefully and as quickly as possible. If a great deal of pain is present in the spine, the patient must be lifted out of the bed by means of the sheet on which he lies, and with it lowered into the bath. The head should not be touched during transportation. After the bath the patient is wrapped in a woolen blanket and has a light cover thrown over him; no drying or rubbing of the body is to be attempted. In this envelopment the patient is to remain an hour, when he may be removed. The time of day for the bath is unimportant, but the very early morning hours or late evening hours should not be selected." (Baruch.)

The warm full bath has been used for diagnostic purposes. Stricker[1] says it permits the abdominal organs to be palpated, and may be used in place of an anesthetic. He has diagnosticated displacements and adhesions of the abdominal organs; atrophy and enlargement of the

[1] Centralblatt f. innere Medizin, March 8, 1884

liver, spleen and kidney; calculi in the gall-bladder and renal pelvis, exudates and tumors which could be felt vaguely or not at all by the ordinary methods of palpation.

From personal observations the author has seen good results from these baths in the various forms of meningitis, and in recent literature cases have been reported in which they proved of service.

In various functional and nutritional nervous disorders, in insomnia, irritability and nervousness, the author prefers the neutral bath, to be described later.

The Cleansing Bath.

As a natural corollary to its therapeutic action, we next take up the full warm bath as a cleansing agent. The ordinary tub is filled with water at 96° to 100° F. and the body immersed. The skin having become softened by contact with the warm water, is then thoroughly soaped, rubbed with the hand or flesh-brush and the lather then removed. After the skin is thoroughly cleansed it is dried, preferably with a coarse Turkish towel. The aim of this bath is cleanliness: it softens the epithelium and debris upon the surface, rendering them better suited to removal. The alkali (soap) aids in saponifying the greasy elements as well as softening and dissolving the epithelium or scales. It goes without saying that a brush, by its mechanical action, quickly removes the various excreta. A cleansing bath should be taken at least *three times weekly* in cold weather and every day in summer, though in summer the use of soap is hardly necessary each day. The value of the cleansing bath lies in its removal from the surface of various foreign impurities, preventing the clogging up of the mouths of the various glandular ducts or "pores" that open their millions of mouths upon the skin. It will be recalled that, in speaking of the skin in an earlier chapter, its physiologic action was that of an excretory organ, and for this as well as for esthetic considerations of those around us the skin should be kept clean. In winter, when baths are less frequently taken, the use of the flesh-brush between baths will aid in preventing accumulations of cuticle and dirt.

The bather is left open to the danger of "catching cold." This can be easily averted by the use of the shower ordinarily found in private homes. The cold shower causes a reaction, the bath being thereby more beneficial and colds prevented. The very young, the very old, and the sick do not stand cold water well, as a rule, but there are few, indeed, that cannot be educated to react and derive benefit therefrom.

In this connection a word might be profitably said with regard to the

Bathing of the Infant.

It may be taken as a general rule that young infants and children are coddled as regards cold water, and this is especially true with

regard to girls. No newly-born baby is to be plunged into a cold water bath, but by gradually diminishing the temperature they can soon be taught to stand reduced temperatures. In summer, when they are suffering from all that babies have to endure, especially in a large city, their resistive power and vitality can be greatly increased by bathing or sponging them several times daily with cold water. It has a valuable effect in reducing the diarrheal influence of summer. By bathing, by keeping them out of doors, clothed in little cotton garments, as nearly savage as possible, babies and little children will be spared many hours of suffering, mothers weeks and sometimes years of anxiety, for some diseases, starting in infancy, cling to maturity or even unto the grave itself.

The Neutral Bath.

The neutral, or indifferent, is a full bath, and is administered in the same manner as the preceding forms of application of this measure—that is to say, with an ordinary tub of sufficient length to permit of the patient's reclining comfortably with the shoulders and body well covered with water. The author believes that the term neutral more nearly describes this bath than any other, as it literally occupies the peculiarly unique position of being "a neutral" between the extremes of hot and cold. The temperature of the bath ranges between 94° and 96° F., and should never be administered higher than the last-named figure. As its duration is usually over lengthy periods of time, it is essential that more hot water be added should the temperature fall below the indicated figure. The bath is administered as follows: The tub having been filled to sufficient depth and the proper temperature secured, the patient steps into and reclines in the water. A strap, head-rest or pillow should be so arranged as to enable the patient's head to be perfectly comfortable. The question of a cold compress to the head is one that may be left entirely to the patient's wishes.

The duration of the bath ranges from one-fourth to one hour, although, as we shall see, it may be administered continuously for weeks or even months at a time. No friction is used, all mechanical effects being avoided before, during and after the bath, for its object is sedative, and therefore any measure that possesses stimulating effects should be omitted.

Physiological Action of the Neutral Bath.—The physiological action of the neutral bath is almost entirely limited to the nervous system, and it is for this reason that it has attained such a position as a calmative agent. Upon first entering the bath there is a slight sensation of coolness, followed by a sense of comfort. It lowers surface, although buccal temperature is not affected, a fact which the author has repeatedly and carefully tested. It produces no thermic



PLATE 87—The Continuous Bath

reaction whatever, and in this respect occupies an unique niche in hydrotherapeutics. Its action upon the circulation is negative, although the pulse-rate is moderately diminished. There is no circulatory reaction and should be none, as the aim is distinctly to avoid such reaction. Upon respiration and tissue change it is also negative. Upon the nervous system, however, we find the neutral bath a central and peripheral sedative of no mean value, and it is, in fact, the most purely sedative application within the whole range of hydrotherapy. As before stated, in the full warm bath Hyman and Krebs have shown that by the absorption of water the nerve terminals in the skin become succulent and blunted and convey fewer impressions from the surface. This is true; but in addition reflex irritability is much lessened. Enveloped and protected as the skin is by the bath of neutral temperature, it must follow naturally that impressions from the exterior are mechanically shut off and an additional sedative action thereby gained. Others have stated that the action of the water upon the peripheral nerve endings was not really that of absorption from the water of the bath itself, but that the water of exhalation was retained within the skin and the nerve structures thereby became saturated with their own water rather than by direct absorption. The fact remains, nevertheless, that nerve sensibility is decreased, no matter which explanation or theory is accepted. Upon the brain and spinal cord the neutral bath is reflexly a sedative, quieting cerebral action and inducing drowsiness.

This is possibly assisted by the increased quantity of blood at the surface inducing cerebral anemia. The lessening of reflex action from the surface has a contributory influence in causing cerebral and spinal sedation. The action of the neutral bath upon elimination is principally shown in the urinary secretion, in which the water is increased and its acidity diminished. The bath is likewise open to the same objection as the full warm bath, in that the patients are liable to chill and catch cold. For that reason they should be quickly and promptly dried, *without friction* and carefully covered to prevent loss of heat. Unless this is done evaporation takes place from the surface and patients suffer evil rather than good results from its application. Should the hair be damp it must be carefully dried and if necessary covered by a turban.

Therapeutic Application of the Neutral Bath.—It is in the domain of nervous diseases that the neutral bath reaches its highest degree of efficiency, particularly in the functional and nutritional disorders of this domain of medicine. Worthy of a special and separate description is its use in insomnia, the author having demonstrated it to be one of the most satisfactory and safest of physiologic hypnotics. In the management of habitués of morphine, chloral, cocaine and alcohol this bath can be applied with the confident assurance of immediate

temporary and eventual permanent benefit. In neurasthenia and hysteria the writer has not found it of signal benefit as the more stimulating and tonic forms of hydrotherapy, but has used it especially for the relief of the insomnia that usually accompanies the condition. In cases of renal insufficiency it may be counted upon to provoke a free excretion from these organs. The writer has frequently suggested the use of the neutral bath at bedtime, to busy and overworked professional and business men who, while they are not really sick, still need some satisfactory hypnotic to produce physiological rest and sleep. In pruritus this bath relieves, especially those that have their origin in the more purely nervous and vasomotor conditions of the skin. The author recalls an interesting case of this character in a physician who was under his care several years ago and who obtained immediate relief from the neutral bath. In the painful states that accompany neuritis, both simple and multiple, much relief and comfort may be obtained by the use of this bath, as it shuts out peripheral irritation and in that way lessens pain and suffering. This bath is especially suited for private practice, if patients were only willing to undertake and carefully carry out the physician's instructions.

In conclusion, it might be stated that it is well to use during the day time stimulating hydrotherapy and thus avoid any debilitating influence that might arise from the bath.

One of the most lasting impressions the writer ever received during his European sojourn, was the influence of the neutral bath as applied to the treatment of mental disease. This was observed in its use in Bethlem Hospital, London; maniacal cases became calm and quiet by an hour's sojourn in the bath, and in this hospital, as well as in several on the continent, the method has been employed with much success.

In this connection we should consider

The Continuous Bath,

which is nothing more or less than the neutral bath continued for hours, days, weeks or even months at a time. This bath is in the author's experience rarely employed in America, but is used quite a good deal in certain places upon the continent of Europe. The method of its application is somewhat different, in that a larger bath tub must be provided, with a set of hooks or buttons along the outside, by means of which a sheet can be secured with strings or tapes. The object of this is to suspend the sheet, with the patient upon it, within the tub, yet completely immersed in the water. The sheet should be so arranged that it will not touch the bottom of the tub, but will suspend the patient entirely in the water, similar to the position assumed by one lying in a hammock, although this is not absolutely



PLATE 88—The Continuous Bath

necessary. The patient must be comfortable if the tub is to become his habitation for many hours or weeks. A rubber air pillow should be adjusted beneath his head. Arrangements must be made for maintaining a continuous neutral temperature, and the most satisfactory way in which this can be accomplished is to have the "mixed" faucet of hot and cold water entering at one end and an outlet at the other. It is essential that the water be protected from the atmosphere and all drafts. This is easily secured by fitting wide supporters across the top of the tub and covering them with blankets. It is necessary to remove the patient for the purpose of urination and defecation.

This bath is usually applied both day and night, and for that reason as well as watching the temperature of the water a nurse is required to be in constant attendance. Unless care is exercised the skin will peel and pucker under prolonged immersion, but this can be obviated by the use of mutton suet or some other oleaginous preparation.

Baruch[2] says: "To Reiss, who studied this unique bath method thoroughly in a large number of cases from 1874 to 1876, we owe all that is known of its application for the treatment of internal diseases. The physiological effects upon the organism which may be expected from lying in a bath of from 94° to 95° F., either continuously night or day, or for a number of hours, are of a negative character. There is neither a thermic irritation of the sensory cutaneous nerve endings, nor any change in the cutaneous vessels, blood pressure, cardiac action or respiration. In every case in which Reiss applied the continuous bath he made careful temperature, pulse and respiratory measurements, which demonstrated that the last two usually fluctuated only for a short time after the bath was entered. The most reasonable explanation of the effect of the continuous neutral bath is to be sought in the diminution or removal of those cutaneous irritations (rapidly changing temperatures, etc.) which are in operation in the ordinary contact of the body with air, and the resultant effect of this freedom from communicated irritating influences upon the inner organs, especially the nervous system." The continuous bath is useful in serious disturbances of the central nervous system, especially of the spinal cord. In those conditions of paraplegia of the lower extremities, paralysis of the bladder and intestines occurring in locomotor ataxia, myelitis, and similar diseases, it is especially useful. Despite the greatest care, bedsores occur and progress to serious proportions in these cases, compelling resort to the continuous bath, which has proved to be the most effective remedy for this serious, discomforting and painful trouble. It was through his treatment of bedsores that Reiss obtained surprising results in the improvement and retrocession of organic nervous diseases, such as spinal pains, eccentric

2 Ibidem.

pains in the extremities and contractures which often rendered any position in bed painful and caused reflex spasms and similar manifestations.

Prolonged submersion in water of neutral temperature exercises a calming effect upon the irritability of the brain and offers a basis for favorably influencing those diseases of the nervous system, in which therapeutic efforts are usually so fruitless. "In about one-half of the cases of spinal and cerebral organic disease, which exceeded one hundred and which were subjected to these baths for several weeks, the improvement, not only of the symptoms, but in the disease itself, was undeniable. The motor and sensory paralysis, ataxia and related symptoms receded under the baths, although they had been but slightly influenced or remained unaffected under the use of other therapeutic measures which had been applied during many preceding months." (Reiss.)

During the author's sojourn in Vienna he had the pleasure of seeing some of the work at Prof. Hebra's clinic with the continuous bath for extensive burns and some very chronic conditions of skin trouble. The results obtained were satisfactory, and the author believes this bath should be much more often used than it is.

All are familiar, doubtless, with the interesting accounts of the continuous bath as administered at Leukerbad, Switzerland, in which the patients remain immersed for weeks at a time in a large pool. Those that are capable of moving about play cards, eat their meals upon floating tables, and in other ways relieve the tedium of their confinement in the water.

The Nauheim or Effervescent Bath.

The Nauheim, effervescent, or carbon dioxide bath has become one of the fully recognized procedures of hydrotherapy, and is most efficient in the treatment of certain diseases, especially those of the heart. With these baths the names of the Drs. Schott will be indelibly associated, for it was through their unceasing scientific labors that the baths of Nauheim gained their reputation and produced such excellent results. It is interesting to note the wide liberality and breadth of mind found in the announcement of Drs. Schott,[2] who have insisted that the artificial baths possess similar if not nearly identical effects, provided that they are so prepared as to resemble the natural Nauheim baths in their principal ingredients, and that by varying the quantity of saline used and the amount of effervescence graduated, results can be obtained practically identical to those of the natural waters of this famed spa. It will therefore be seen that the discovery was not of a unique water, but of a method and principle of hydriatic application.

2 See Diseases of the Heart.

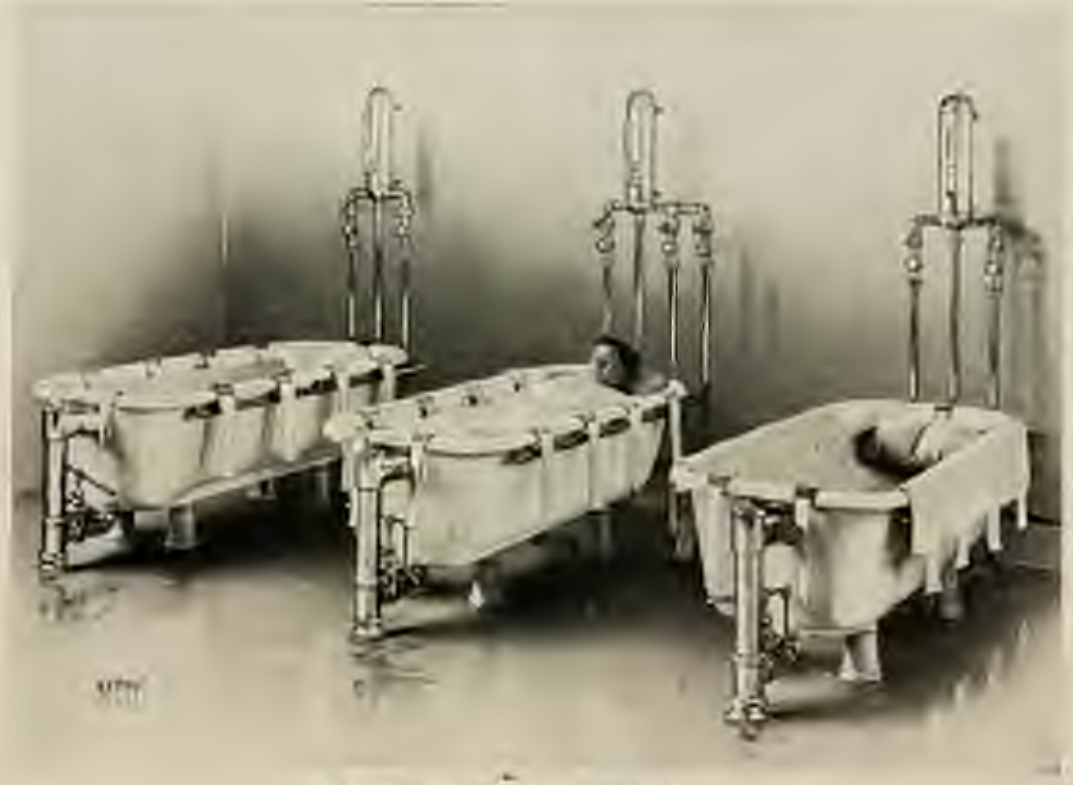


PLATE 88a—The Continuous Bath

For this bath, the usual porcelain-lined or wooden tub may be used, of sufficient length to permit the patient to recline comfortably. I prefer a tub about seven feet long and broad, so as to have ample room. The tub should be filled with water at a temperature of from 90° to 94° F., it being well to commence with the neutral temperature of 94° F., a reduced quantity of salines and hydrochloric acid. With succeeding baths these latter may be increased and the temperature lowered.

The simplest formula used in this country is that of—

Sodium carbonate (Na_2CO_3) ..... 300 grams.
Commercial hydrochloric acid (HCl) ..... 300 grams.

This to be gradually increased to 800 to 1,000 grams each of salt and acid.

Another formula consists of—

Sodium chloride ..... 8 lbs.
Calcium chloride ..... 12 oz.
Sodium bicarb. ..... 1 lb.
Commercial hydrochloric acid ..... 1½ lbs.

In preparing these baths the saline ingredients should be first dissolved and then the HCl added. To rapidly prepare the bath, invert the bottle below the level of the water, remove the stopper and move the bottle over the surface of the bath, so as to distribute the acid evenly over the surface and secure uniform effervescence.

"Hydrochloric acid may be dispensed with by employing the substances indicated in the subjoined formula. The powders are dissolved in the water in an ordinary full bath. No harm is done to tin-lined copper tubs.

"FORMULA FOR ONE POWDER.

"Sodium carb. (sal soda) ..... 4½ lbs.
Calcium chloride ..... 3 lbs.
Sodium bicarb. ..... ½ lb.
Sodium chloride ..... 2 lbs.
Sodium bisulphate ..... 1 lb.

"Mix and dissolve the first four ingredients; then add slowly the sodium bisulphate, which should be kept by itself. It is not desirable to produce very marked effervescence, but rather to secure the saturation of the water of the bath with CO_2.[4]

"The carbonic acid gas is produced by this formula very slowly, so that it is nearly all absorbed by the water, thus making the method an economical one.

"It should be remembered that it is the CO_2 dissolved in the water, and not that which escapes by effervescence, that produces the desired effect upon the skin. Generally the bath should be taken two or three days in succession each week, then one day's respite be allowed. With persons in good strength, four or five successive baths may be given." (Kellogg.)

[4] Each bath costs about eighty cents.

Some idea as to how these baths may be graded from weak to strong may be gained from the schedule below. Each bath consists of forty gallons of water:

Bath No. 1—Temperature 94° F., duration 5 minutes, sodium chloride 4 lbs., calcium chloride 6 oz.

Bath No. 2—Temperature 92° F., duration 6 minutes, sodium chloride 5 lbs., calcium chloride 8 oz.

Bath No. 3—Temperature 90° F., duration 7 minutes, sodium chloride 6 lbs., calcium chloride 10 oz., sodium bicarbonate 8 oz., HCl 7 oz.

Bath No. 4—Temperature 88° F., duration 8 minutes, sodium chloride 6 lbs., calcium chloride 10 oz., sodium bicarbonate 8 oz., HCl 7 oz.

Bath No. 5—Temperature 88° F., duration 8 minutes, sodium chloride 7 lbs., calcium chloride 10 oz., sodium bicarbonate 8 oz., HCl 10 oz.

Bath No. 6—Temperature 87° F., duration 10 minutes, sodium chloride 7 lbs., calcium chloride 10 oz., sodium bicarbonate 8 oz., HCl 10 oz.

Bath No. 7—Temperature 87° F., duration 10 minutes, sodium chloride 8 lbs., calcium chloride 11 oz., sodium bicarbonate 12 oz., HCl 14 oz.

Bath No. 8—Temperature 85° F., duration 12 minutes, sodium chloride 8 lbs., calcium chloride 11 oz., sodium bicarbonate 12 oz., HCl 14 oz.

Bath No. 9—Temperature 85° F., duration 12 minutes, sodium chloride 10 lbs., calcium chloride 12 oz., sodium bicarbonate 1 lb., HCl 1 lb.

Bath No. 10—Temperature 85° F., duration 15 minutes, sodium chloride 10 lbs., calcium chloride 12 oz., sodium bicarbonate 1 lb., HCl 1 lb.

Baths Nos. 11-20.—Temperature 83° F., duration 15 minutes, sodium chloride 10 lbs., calcium chloride 12 oz., sodium bicarbonate 1 lb., HCl 1½ lbs.

Another method that may be employed is that of the "Triton Salts," as follows: Fifty gallons of water to which is added five pounds of common or sea salt and the contents of the bag of sodium bicarbonate. The bottom of the tub is then covered with rubber sheeting. On this rubber sheeting place the eight acid cakes from the box of Triton salts so that two shall lie at the back, two on each side of the body, and two under the knees. The bath is now complete. In about three minutes, when effervescence is well under way, the patient should lie down in the bath and rest quietly without unnecessary movement. The temperature and duration must be graduated. It can be regulated by using more salt, up to fifteen pounds, and fewer number of acid cakes, during the first few baths. The author does not believe in the use of carbon dioxide gas; the tanks and apparatus are cumbersome; it is more expensive (with me) and the evolution of gas is too rapid.



PLATE 88.—Common Bath, or Bathing at Leukbad, Switzerland.

The duration of these baths should be carefully graded to meet the patient's strength and requirements. For an average case eight minutes' duration, gradually increased to fifteen minutes, is a good rule, remembering that the time of the previous bath should not be lengthened when the acid or saline constituents are increased, but a bath should intervene. Twenty or thirty baths usually constitute "a course," a day being allowed to intervene after every third or fourth bath. The saline and acid is begun weak, the temperature high (94° F.), the duration short (five minutes). Increase the quantity of the constituents and carbonic acid gas gradually and reduce the temperature (94°) two degrees daily to 85° F., or even lower. The patient reclines quietly in the tub. He must not talk. When the time elapses he is assisted from *the tub and rubbed dry with a warm towel*, avoiding exertion or exposure. It is best to remain quiet, or, better, recline for one hour after the bath. Where there are infiltrations or deposits in the system local massage may be applied to them after the bath. The pulse should be counted, percussion and auscultation performed, notes and diagrams made both before and after the bath.

Schott[1] calls attention to the fact that the chloride of sodium and calcium are the salts most active in the waters of Nauheim. For cardiac disease the baths are given in conjunction with graduated resistive exercises. It should be noted that the Nauheim bath is a saline, carbonic acid gas, neutral bath, in the great majority of instances, immersion in which *produces* a transient chilliness, accompanied by a sensation of oppression of the precordia and respiration, lasting but a moment. As this passes away the *respirations* become slower, fuller and deeper, the reduction amounting in ordinary cases from two to four per minute, unless the respiration is very rapid, when they are correspondingly reduced. As the respiration quiets the lung capacity is increased and the exchange of O and CO_2 favored. The thermic influence is small, and *temperature* is little affected, compensation being rapid. After immersion minute bubbles of carbon dioxide collect upon the surface of the skin, and recur immediately when brushed off. These bubbles, in the presence of a saline medium, affect profoundly the superficial nerves, resulting in marked vasomotor effects, by which the cutaneous circulation is stimulated, the blood-vessels dilating and the column of blood thereby being directed to the periphery. This flooding of the skin "lifts the load" from the heart, sucks the blood from the congested viscera of thorax and abdomen, thereby better "equalizing" the distribution and movement of this fluid. In normal individuals I have observed a fall of ten and even fifteen beats, while very rapid pulses may be reduced

[1] Schott, A.: Baths & Mineral Hydrotherapy, 1891; Schott, Theo.: Medical Record, March 11, 1899, p. 361; Medical Record, March 26, 1898.

thirty to forty beats by a single bath, meaning reduced cardiac labor. This surface effect—that is, lessened peripheral resistance and firmer cardiac action—is a response that resembles the action of digitalis and nitroglycerine, without their drawbacks. The heart is directly affected. If it is auscultated and the pulse studied before, during and after the bath, it is found that the heart beats slower and stronger; the rhythm becomes regular, and the sounds clear. Systole and diastole are both prolonged, the arteries dilated. The pulse grows full, increases in force, and the blood pressure rises to the extent of 20 or 30 mm., denoting a greater quantity of blood in the arterial system. The vertical sphygmograph lines are higher and the horizontal ones wider, indicating a longer time for the passage of blood from aorta to capillaries. If these conditions are carefully studied it will be readily seen that there is a beneficial stimulation to the heart which must augment its tone and improve innervation of the cardiac muscle. The enlarged and feeble heart is contracted often 20 per cent. during a single bath (see cut). One has to see these results to be willing to accept such a seemingly improbable statement. This reduction of area, as shown by percussion, is accompanied by marked increase of cardiac power, with lessened resistance to heart action. In old cases of valvular lesions the increased rest afforded the heart muscle enables it to feed, regenerate, hypertrophy and thus compensate its lesions, a result that is curative, and that cannot be obtained by drugs. With the resistance to the flow of blood decreased, a weak or dilated heart muscle contracting fully compensates, following the physical law that a muscle that works naturally increases its tissue and strength, consequently hypertrophies. Another beneficial effect of the dilatation of the peripheral arteries is the reduction of intracardiac pressure, a no mean factor in promoting the contraction of a dilated heart. A fortunate feature of the bath is its eliminating action upon rheumatic toxins, because of the frequent association of rheumatism as a cause and concomitant of heart disease. Heart sounds are rendered clearer and abnormal sounds, which were not noticeable before the bath, are plainly brought out, and auscultation more clearly reveals the real condition of the organ. The increased metabolism that follows these baths is due to better elimination and circulation, for with the relief of the congestion existing the metabolic and cellular processes of the body take on renewed functional activity, this being especially true of the abdominal and pelvic organs. In view of this it is not surprising that the kidneys begin to act more freely and continue to do so for a long time after the baths are discontinued. The peripheral nerves are promptly affected by these baths, transmitting the impressions made by the thermic stimuli (where the bath is below 92° F.), the saline medium and CO_2 gas, from the surface, through the spinal cord to cerebral

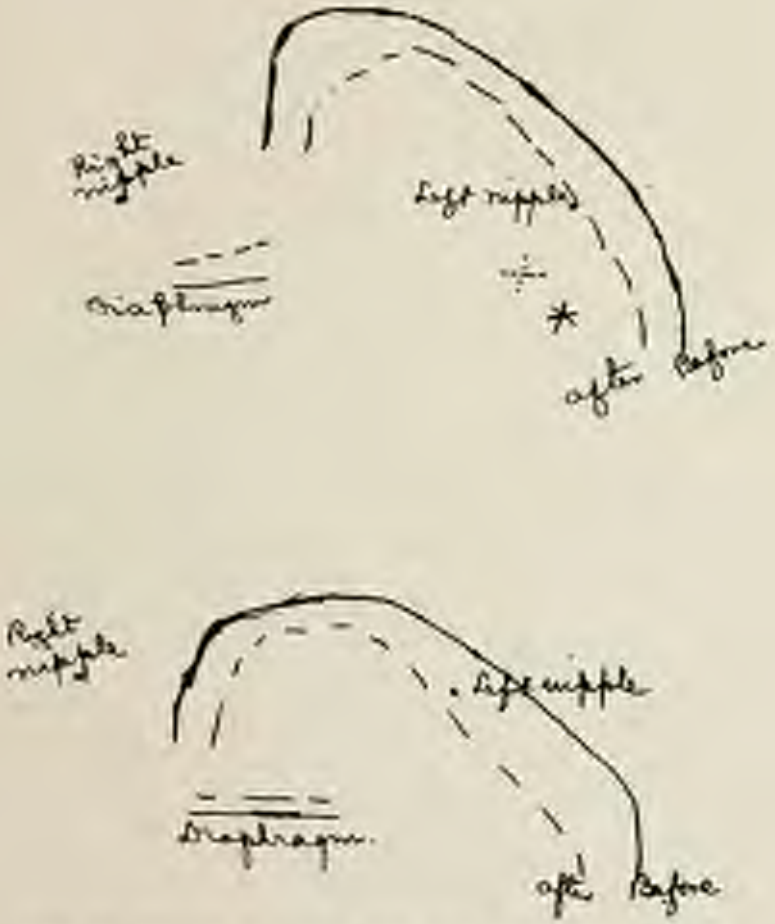


PLATE 30—Diagram of Cardiac Area at Diffusion Before and After Vacuum Bath

centers associated with the vasomotor and cardiac apparatus, and from them through the pneumogastric to the cardiac ganglia, and from the vasomotor centers peripherally to the cutaneous and associated vascular trunks. Upon nerve tissue it is stimulant to renewed activity, producing tone and exhilaration, and in those neurasthenic cases complicated with cardiac trouble, changes remarkable to behold follow its use.

It will thus be seen that the Nauheim bath acts upon the smaller blood-vessels and capillaries of the surface; that they are dilated; that ventricular contraction is relieved; causes a slowed pulse and completely emptied heart; tonal capillaries and greater volume of distal circulation; better neuro-cardiac action; increased action of skin and kidneys; trophic and other nerve influences.

Therapeutics of the Nauheim Bath.—The greatest usefulness of this bath lies in the domain of cardiac and vascular disease, for it possesses all the value of hot and cold baths without the disadvantage of the extremes of temperature, in the one instance (hot) preventing harmful excitement and in the other (cold) avoiding the increased work placed upon the heart itself. It should be distinctly borne in mind, however, that the Nauheim bath in the treatment of heart disease is but a part of a system of baths and graduated exercises, and that these latter play a most prominent part. In cardiac disease the patient must not be exhausted, and if weak should be rubbed during the bath. It has an extended field of action in some of the most intractable diseases with which practitioners have to contend, such as endocarditis, valvular insufficiency, arterial and cardiac stenosis, cardiac dilation, Basedow's disease, all forms of motor and sensory cardiac neuroses, and finds a contraindication only in conditions in which an increased arterial pressure would be dangerous, such as pronounced arterio-sclerosis, aneurism, fatty degeneration and angina pectoris accompanied with sclerosis of the coronary arteries. In those cases of chronic so-called rheumatic or articular disease favorable results have been obtained from the use of these baths. The author does not recommend them in rheumatic diseases, unless they are complicated by organic heart disease. Sometimes the gouty and rheumatic suffer from a recrudescence, but this is usually of short duration. Those afflicted with chronic pelvic disease of a congestive or inflammatory type receive marked benefit from the derivative and metabolic influences produced by this bath. In locomotor ataxia I can confirm the praise that many writers give to this bath; it is certainly of value. It may be used as a half or full bath, and during its use the limbs may be rubbed. The bath is contraindicated in acute and subacute inflammatory diseases of the spinal cord.

Oxygen Bath.

Winternitz[5] has recently studied the action of oxygen instead of carbon dioxide baths. It is an effervescent bath, the action of which is not due to any oxygen absorption, but to the physical and chemical irritation of the presence of oxygen in the water, in the same manner as the carbon dioxide bath. The oxygen bubbles are smaller, adhere closer to the surface in a layer between the skin and water. They cause a pleasant prickly sensation, and alter the thermic impressions arising from the surface. The temperatures are the same as the Nauheim bath. Baths given at 86° F. decreased blood pressure 35 mm. Hg. while in the bath, and twenty minutes after the bath a further drop of 58 mm. took place. At 97° F. the pressure was lowered 25 mm., but before the end of a ten minute bath was 10 mm. above pressure at beginning. In a CO_2 bath at 86° F. the pressure was reduced 35 mm., but during the bath began to rise, and one hour later was only 10 mm. lower than before. Fresh water lowered pressure 20 mm. during and increased slightly in half an hour later. The best temperature, therefore, to reduce blood-pressure is 86° F. The relative frequency of the pulse was studied. At 68° F. the pulse was reduced by fresh water, 18; by O_2, 12; by CO_2, 12; at 97° F. fresh water reduced 8; O_2, 8; CO_2, 2 beats. Temperature supplemented by the mechanical and chemical action of the gas is most important in affecting blood pressure. Oxygen bubbles cause goose flesh, owing to the rhythmical contraction of the cutaneous muscles. This increases "Hutchinson's peripheral heart." It finds its sphere of usefulness in high blood pressure, cardiac neuroses, neurasthenia and cases sensitive to low temperatures. Low blood pressure contraindicates.

The Full Cold Bath.

This is one of the most powerful of all hydriatic procedures, its use being practically limited to acute infectious diseases. It is known in this country as the Brand bath or "tubbing," acquiring its name from its originator, Dr. Ernest Brand, of Stettin, Germany. When used by those in health or in certain non-infectious diseases its action, aim and object are entirely different from the action of the bath in infectious diseases, and are described under the head of the "plunge bath." The tub to be preferred is a tin one capable of being moved to the patient's bedside. It should be at least six and a half feet long by two and a quarter feet wide. It may be here remarked that tubbing can be carried out in the country as well as in the city, the paraphernalia needed being simple and easily obtained. Where the slightest ingenuity is exerted the object can easily be attained.

In hospital practice one of the tubs here illustrated will be found

5 Winternitz, Wm.: Elements f. Klinische Hydrotherapie, January, 1905.



Typhoid Fever Tub (Bellam's)



Pneumonia Hospital Tub (Otis's)



PLATE 30—Portable Bath Tubs

more useful, because of their superior durability and the ease of cleaning them. The shape of the tub is well shown in the diagram. It is fifty inches long and twenty-seven inches wide, and consists of two parts, so arranged that the patient's lower extremities are bent at right angles to his recumbent body, the feet resting upon a double bottom which is filled with hot water. The latter is poured into the douche bottom through a tube with a funnel-shaped opening, which is secured in one corner of the tub; a faucet upon the posterior aspect of this hot-water receptacle gives exit to the hot water. The object of this tub is to afford the patient an easy recumbent position and prevent the cold water from chilling the feet and producing painful cramps during the bath. Its short and compact form renders it more portable than the ordinary tub. The manufacturers[7] have constructed the bath-tub of highly enameled wood and lined it with tinned copper, this rendering it easily cleaned. The height of the tub saves much back strain to the nurses, whose constant attention is required for friction during the continuance of the bath. Among the best portable tubs is the Cole.[8] It is a safe and efficient means of administering the Brand bath, especially in bed. It is more easily managed in private homes and is less feared by patients. It is a full-sized pneumatic tub, that may be inflated by introducing air with an ordinary air pump, and deflated by opening the air-escape valve. It is made of rubber fabric. On a level with the bottom is a funnel sleeve through which water may be poured into or removed from the tub. The entire outfit—tub, pump, towels, etc.—may be packed for transportation in an ordinary suit case 13x26 inches. A blanket is first spread on the bed and the tub placed on top of it. The patient is then assisted by the nurse, who first gently lifts the head and shoulders, then the hips and legs onto the deflated tub (see cut), the walls of which are then inflated by the air pump, requiring but a minute. The water at proper temperature is then poured in and the process hereafter to be described carried out (see cut). When completed the nurse lowers the funnel sleeve into a suitable vessel on the floor by the bedside and the water quickly flows out. At the same time the air is allowed to escape from the valve, allowing the tub to collapse. The patient is now removed from the tub upon the blanket (see cut).

Ordinarily after the tub has been secured a piece of oil cloth, carpet or other protective of sufficient size is placed on the floor by the bedside in order to protect the floor or carpet. The tub, with its head at the foot of the patient's bed, is then placed on two low stools or wooden rests so as to bring its rim on a level with the patient's bed. It should be separated from the patient's bed by a

7 Kny-Scheerer Co., 234 Fourth Avenue, New York City.
8 Cole Bed Bath Co., Knoxville, Tenn.

screen. Several towels, a sheet, and a napkin should be at hand. The tub is now filled with water to a depth sufficient to cover the patient, at a temperature ranging from 85° to 65° F. Where possible the tub should be partly filled with water outside the patient's room, the correct temperature being secured by the addition at the bedside of water either hot or cold. Every effort is made to make as little disturbance as possible and all excitement must be promptly eliminated. A double blanket is spread on the bed to be occupied by the patient; over this is placed a dry and soft linen sheet and the pillow or bolster covered with a crash towel. Everything being in readiness, the patient receives a stimulant. This one point of a stimulant is much opposed by some who use the full Brand bath; the author believes in its use only in emergencies. The night dress or night garments are removed and the sexual organs protected by a napkin. The face is now bathed in cold water (50° F.), and a cold wet turban placed on the head. There should be no evidence of faint-heartedness or lack of confidence in the application of this bath by the nurse or physician, should he be a bystander, and it is a good rule for the physician to *always* be present at the first bath. All members of the family must, if possible, be excluded from the room. The patient is now gently lifted from the bed and placed in the bath. The first impression is exceedingly disagreeable, and he is apt to gasp and shrink from its further use. He must be encouraged and reassured both by word and action, for an entire absence of haste and fussiness will do much to overcome his very acute desire to be let off from what he will term severe treatment. Here, as in many of the positions in which a physician is placed, tact will accomplish wonders. My observation, however, leads me to believe that the family are, as a rule, more difficult to manage than the patient, as they are usually strangers to cold water in their daily ablutions, and share with the patient the feeling of repulsion. As soon as the patient is immersed, the nurses commence to gently rub or chafe the entire body, rubbing the different parts successively, but avoiding the *lower abdominal region*. Too great stress cannot be placed upon the need for this rubbing, and its careful and continued use during the bath is the *one absolutely necessary* feature to success. Brand truly states that by its use collapse, cyanosis and heart failure are prevented, and this is readily believed by those who have used the bath and seen the redness that follows its application. Under the influence of cold and friction there is a contraction and dilatation of the peripheral blood-vessels, and, as we shall see later, this enhances heat abstraction. No attention should be paid to a small pulse, to complaints of chilliness, to a shrivelled condition of the skin of the hands and fingers, for these do not demand cessation of the bath, but care and attention should be given to the face, especially the lips, and if cyanosis occurs it is due to ex-



PLATE 92—Patient in Deflated Tub



PLATE 93—Inflating the Tub

feebled heart action; for the face, being free from the local action of the cold water, is a true index of a cyanosis due to the lack of cardiac action. Should this occur, the bath must be discontinued and the patient removed. In the use of the next bath more attention must be paid to friction, for it may be taken as a good rule that where friction is well applied no such result is to be expected. During the bath the turban on the patient's head must be re-wet. The temperature at which the bath is administered is usually 65° F., but it is a good plan to commence at 85° to 90° F. and reduce each bath from three to five degrees until 65° F. is reached, at which point the temperature is maintained. The duration of the bath is usually fifteen minutes, but here again it is also a good plan to commence with five to seven minutes and lengthen the time as the temperature of the water is lowered. It must be *again reiterated that friction* is the element to watch, making it as vigorous as the patient will stand. The patient should not be removed during the primary reaction, as the aim in this bath is *not to secure ordinary hydrotherapeutic reaction*. The bath being finished, the patient is lifted out of the tub and placed on the prepared bed, the napkin dropped from the pelvic region, rapidly covered with the dry linen sheet, the folds of which are pressed between the arms and the body and between the lower limbs. The blanket is then wrapped around the body and hot-water bottles placed to the feet, which are usually cold. The wet turban is now removed from the head. The patient's hair is dried while he lies from five to ten minutes in the sheet and blanket. He is then to be gently dried with towels, the night dress put on, the blanket, sheet, etc., removed, and covered lightly with the bedclothing. If the bath is successful, the patient is quiet, comfortable and usually falls asleep. If he is restless, is uncomfortable and shivers, the technique is inaccurate and points to a change in the temperature, duration or friction, especially the latter. The hot-water bottle should be allowed to remain only a few moments, as it is unnecessary, and usually becomes needless after a few baths.

Physicians and others who have been subjected to both varieties of baths claim that the sudden immersion into the coldest temperature required is far less unpleasant and chilling than the gradually reduced bath. The latter is certainly more fussy and troublesome.

"*The Ziemssen graduated bath* belongs also in this category. Ziemssen has the patient sit in a bath the temperature of which is 5° or 6° C. (68° F.) in the course of ten or fifteen minutes. The duration of the entire bath is from twenty to thirty minutes, until the patient ceases to shiver in spite of vigorous frictions and affusion. He is then removed and placed in a previously warmed bed. The bath is far more efficacious in its antipyretic effect than the cool baths of short duration. There will be observed a decline in the temperature of so much as 2½° C. (4.5° F.), but the stimulating influ-

ence upon the vascular and the nervous systems is wanting, and depression is often more serious than even a considerable elevation of temperature."*

Physiological Action of the Full Cold Bath.—Before we consider in detail the action of the Brand bath (full cold bath with friction), it is well to first take up the part played by friction. As has been shown heretofore, its application produces a stimulation of the cutaneous blood-vessels, that dilate under its use, so that a large quantity of blood is made to traverse the skin, which in this instance gives a larger radiating surface for heat abstraction and cooled blood exchanged for warmer. By the prevention of tremor, muscular contractions, both tonic and clonic, are eliminated, and one of the means of heat compensation checked; thus production of heat is prevented at the same time that the cold water abstracts greater heat; for, as Pospischil has shown, mechanical irritation of the skin decidedly increases heat loss, which increase he placed at as much as 95 per cent. With this preamble we are ready to consider its action upon circulation.

As soon as immersed, contraction of the superficial tissues takes place, especially the blood-vessels, and accompanied by tremor. These blood-vessels would remain contracted during the entire bath were it not for the friction. When faithfully performed, the skin takes on a pinkish hue, showing that the cutaneous circulation is more active, and that the column of blood driven from the surface to the interior by the first impact of the water has returned to the periphery. As a resultant, the interior is drained, and the movement of the blood made more active as well as perfect. The pulse is slowed, its tension raised, and while smaller during, becomes much larger after the bath. Sphygmanometric measurements show an increase in arterial tension. The thermic and other impressions arising in the periphery are conveyed to the central nervous system, and from the governing centers therein are reflected upon the cardiac mechanism, as a result of which toning and refreshing influences are brought about, which in turn stimulate the cardiac muscle, energizing it, increasing the force of its contractions, lessening their number, producing a pulse that seems small, though its tension is improved and it possesses increased force. Two conditions result—obstruction at the periphery is removed, and a *vis a fronte* encouraged, while the stronger contractions of the heart increase the *vis a tergo*, a favorable state of the circulation under any circumstances. It should be borne in mind that these influences upon the pulse, heart and circulation do not immediately pass away, but gradually subside between baths. A failure to appreciate the effect of the constrictive action of cold upon the peripheral vessels has led many to find fault with the full cold bath in the treatment of febrile conditions. Again I state, *friction* is the keynote of success.

* Strasser, A.: "Hydrotherapy." Vol. IX. Cohen's Physiological Therapeutics.



Plate 96—Nurse Applying Friction



Plate 95—Dressing Off the Wound

Upon the *temperature* this bath has a most noticeable and impressive effect, but one should here again interpose and state that *the reduction of temperature is not the sole aim of the bath, as so many physicians imagine.* Temperature and the specific typhoid germ are not so dangerous themselves as are generally supposed; in fact, many now believe a moderate range of fever is beneficial in infectious diseases. The danger arises from two sources—the typho-toxins and those metabolic poisons that arise from the pathological tissue state incident to the disease. While the bath first causes contraction of the superficial tissues and tremor, associated with a transient rise in temperature, the friction overcoming this, and producing a marked dilatation of the blood-vessels of the surface, we now have all the factors aiding in heat loss. The body being immersed in the cold medium, with a large area of blood exposed to its action, gives up its heat to the surrounding water, while heat generation is prevented by the elimination of tremor or muscular activity. This loss is somewhat proportional to the dilated state of the blood-vessels, for, as has been shown by Traube, a rise in temperature is usually due to a contraction of the blood-vessels, and that the maximum rise of temperature is coincident with their maximum contraction; hence it is that the effect of this bath upon the circulation above described is to eliminate two of the principal features in the prevention of heat elimination. Reflexly, the contracted internal vessels prevent visceral heat generation. The blood, after giving up its heat, is pushed by the toned circulation into the interior, and bathing the thermogenic centres in a cooler medium favors heat elimination and lessens heat generation, while the superheated visceral blood is driven to the surface. Reduction of temperature follows.

Upon the *nervous system* is to be found the greatest good and most enduring action of the full cold bath. In the majority of febrile infections, be they due to specific micro-organisms or otherwise, their influence becomes noticeable at once upon this important mechanism of the human body, and it is not long before it shows a depreciation in tone that is doubtless due to the toxin of the specific morbific agent. We find that, as a rule, malaise and partial exhaustion present, which, when followed to the ultimate end, simply mean the forerunner of coma, delirium, stupor, subsultus, etc.; sleep restless, dull headache, and a general hardly definable nervous unrest and discomfort, very trying to most cases. Mental function is much diminished, the expression is apathetic; all the ordinary nervous functions diminish in activity. This is usually the condition of affairs when the patient is seen with a fully developed febrile attack. All will probably admit that the greatest danger lies in the overwhelming of the nervous system by these poisons, and that too great care cannot be taken to prevent their evil effects. It has been maintained by those who are

far more competent than myself to speak, that the essential point in the conduct of such cases is the maintenance of the patient's neural vitality until the poison of the affection can be eliminated. While this is in a certain sense true, still it is not all that is necessary. I think it will be found upon close investigation that the full cold bath comes nearer to meeting all the requirements of *each* observer than any other single therapeutic weapon that can be wielded. When we come to study the influence of the full cold bath upon the nervous system in febrile diseases, we find that all the conditions mentioned above are promptly met, and that its application with friction arouses into action all the peripheral nerve endings, impressions from which are conveyed to the great centers, a thousand reflex influences started, that are shunted to every nook and cranny of the central nervous system, with the result that this mechanism is aroused from its lethargy and stimulated to throw off the dominating and paralyzing influence of the acute toxins. The eye no longer appears apathetic, but brighter; the mind clears up and responds more promptly; reflected effects are shown in every function of the viscera, and varied influences travel to the end of every nerve fiber of this governing and dominant system, so that its dynamic power is aroused to fight the battle and maintain its integrity. It is largely because of these effects upon the central nervous system that hydriatists maintain that the Brand bath, when properly applied, accomplishes more than any known medicinal remedy upon temperature, circulation and the nervous system.

Upon *respiration* the first effect of the cold bath is to cause gasping and a sense of disagreeable constriction about the chest. Respiration is increased during the application of the bath itself, and is, as a rule, shallower than normal. Observations made upon this function show that in febrile diseases, as a rule, both the amount of oxygen inhaled and absorbed, and carbon dioxide exhaled and eliminated, are markedly diminished. Immediately upon the removal of the patient from the bath, the respiration usually returns to the normal, and is fuller and deeper than before the application. There is a greater amount of absorbed oxygen and a greater amount of exhaled carbon dioxide, showing that this bath simply bears out the general hydrotherapeutic effects of cold baths properly applied, viz., that there is a marked increase of oxidative processes taking place in the body, and this we would expect, particularly in view of the circulatory changes. Energizing muscular tissues, as the Brand bath does, we find that the amplitude of respiration is enhanced, which of itself acts like a pump in moving the blood through the pulmonary and general circulation, relieving stasis and hypostatic congestion, as well as aiding in the better removal of mucus in the bronchioles. It is almost needless to remark that a better oxygenized blood destroys toxins, specific, metabolic and auto-toxic.



Plate 96—Drying Patient.



Plate 97—Receiving Tub.

Upon metabolism, febrile disturbances, as a rule, prove quite a disturbing factor. The entire economy is combating with a specific toxin, the effect of which upon the tissue is most marked, producing degeneration. The glandular system of the body, especially the liver, in its endeavor to throw off this poison, is particularly prone to be affected, and its failure to act profoundly influences the metabolic processes of the body. All secretions of the glands of the gastro-intestinal tract are diminished in quantity and quality. As these secretions digest food and maintain intestinal activity, their absence or decrease means the development in the intestine of certain bacterial flora, the coli and putrescent ones, which add another factor to the already overburdened and toxic system. Within the tissues oxidative processes are reduced to a low level, so that toxic material of a katabolic character accumulates, being incapable of removal because of a weakened circulation and diminished elimination. With a more active circulation, with a rise in blood pressure, these toxins are pushed out of the liver and other tissues, glandular action is stimulated, the tongue clears, sordes lessens, appetite improves, digestive power is regained. With the respiratory activity and oxygen-absorption, oxidative processes take place, destroying the waste tissue material and toxins, or converting them into harmless soluble end-products capable of easy removal. Nutrition is of necessity enhanced, and degenerative processes prevented, especially if the bath is used from the start. This improved state of tissue is particularly well shown in the improved state of the skin and its glandular structures, which changes from its sallow, dry, harsh and inactive state, and becomes white, moist, elastic and soft.

Upon elimination the action of this bath is specific. The febrile state causes a diminution of the action of all glandular structures that preside over this function, it being especially noticeable in typhoid in the secretion of the kidney and skin. The quantity of the urine steadily diminishes, and assumes its characteristic dark color, turbid appearance and disagreeable smell, while its toxic power rapidly rises until it is several times as toxic as normal urine. The first noticeable effect upon this excretion is an increase of volume, although little change in appearance takes place. Shortly, however, it more nearly assumes the normal, and its increased volume may be maintained, as much as fifty to sixty ounces being passed in twenty-four hours. This is due not to the increased water drinking, as some suppose, but to a better vasomotor tone and rise in blood pressure. The better purification of the blood stream by the more active kidney reacts upon every function and tissue of the body, for just in proportion to the lessening of toxins will the general danger to the patient diminish. The skin of a febrile patient has a peculiar feeling to the touch, and appears dry, dirty, harsh and inactive. Its blood-vessels are con-

tracted, large masses of epithelial cells collect on the surface, the glands act little and their secretion is quickly dried. Its vicarious function in states of toxemia has been pointed out by Bouchard,[10] but this is in abeyance. Immersion in the cold bath, accompanied by friction, upon producing the vascular changes enumerated, resumes its activity. The softening effect of the water and the mechanical removal of the dead epithelium and impacted excretions give the glandular structures an opportunity to eliminate both bacteria and toxins. The skin gradually becomes softer, more pliable and elastic, loses its dingy, dirty appearance, becomes white and pleasant to the touch. As the glands act more freely a slight moisture appears, favorable to elimination as well as to heat loss.

Upon the *blood*, as we have previously shown, cold baths act beneficially. In febrile states the number of corpuscles, both red and white, are not only diminished, but rendered less active both in their oxygen-carrying and bactericidal power. Winternitz and Thayer[11] have shown that the cold bath not only increases markedly the number of red blood cells in the circulation and their oxygen-absorbing and carrying power, but that this is true in typhoid as in health. The interesting rôle that the leucocytes play in their phagocytic capacity is diminished or obtunded in infectious fevers, but the stimulating effect of the cold bath rouses them from their lethargy, increases their number and power to battle with the invading host. The enemy are met and checked, even if they are not completely routed. Breitenstein[12] found in twenty-nine cases that there was an increase of at least fifty thousand red cells to each cubic millimeter, which was accompanied by a corresponding increase of hemoglobin.

In conclusion, it may be said that the cold full bath of Brand rouses the nerve centers, sustains vital power, stimulates respiration and oxidation, increases elimination, energizes the heart, improves the pulse, raises arterial tension, thereby toning the circulation through the vasomotors; purifies the blood, reduces temperature, prevents complications and makes the patient more comfortable. This bath should never be administered when the patients are very old, to infants, when hemorrhage is threatened, when the temperature is subnormal, in the eruptive fevers, pneumonia, nephritis, or inflammations of the visceral organs of abdomen or pelvis.

The therapeutic action of the Brand full bath is practically limited to the treatment of severe febrile manifestations, of which typhoid fever is the type, and for the treatment of which Brand originated the bath. When we come to consider, in the therapeutic portion of this work, the question of the treatment of typhoid fever, this sub-

10 Bouchard, C.: "Autointoxication."

11 Loc. cit., p. 46 —

12 Archiv f. Experiment. Pathologie und Pharmakologie, Bd. 22, 1886.



Plate VII.—Plunge Bath.

ject will be taken up in detail, and therefore will not be mentioned here.

The Cold Plunge Bath.

This bath is usually administered with an ordinary bath-tub of sufficient length to permit of the patient's reclining comfortably with the shoulders well covered by the water. The best tub, of course, is the porcelain-lined tub of good width and fully seven and a half feet long. It may also be administered in institutions in a water-tight tank with a depth of about five feet. It is customary in these institutions to have one end of the tank with steps so that the patient can either walk or plunge into the bath and walk out. The tub should be filled with water ranging from 50° to 65° F., the duration in brief ranging from one-fourth to one-half minute. The plunge bath should not be used save by those who are in excellent and robust health, and never be entered when the skin is cold or chilly. The body must be well warmed, either by some brief hot application, such as a warm bath, dry hot air, electric light bath, Turkish bath, or exercise. The cold plunge is often taken in the morning as a stimulant by the robust. The best effects are, in my opinion, derived from a very sudden immersion of great brevity. It is best to at once "plunge" into the bath, immersing the head, as by so doing the sensation of cold is far less noticeable and much less disagreeable than when slowly entered. Ten to fifteen seconds is ample for the average plunge, although some writers recommend it for a period of even two minutes. During the bath the patient should rub himself vigorously or use swimming movements. Immediately upon emerging he is wrapped in a Turkish sheet and vigorously rubbed until dry. It is essential to state here that vigorous reaction must be secured or the bath is a failure, with distressing and depressing effects.

The physiological action of the cold plunge bath is that of a powerful excitant measure, and for that reason should never be indulged in by the weak or by those who have any heart disease either of a functional or organic character. The sudden impact of the body with cold water at this low temperature produces a powerful stimulation and refreshing effect upon the nervous system, quite similar, in a general way, to the action described in the Brand bath. Upon the heart and circulation this bath adds quite a considerable strain, as the blood suddenly leaving the periphery congests all the internal organs. It has little, if any, temperature-reducing influences, being too short in its duration. The reaction following the cold plunge is probably the most active of all hydriatic measures. The therapeutic indications of the plunge are few. The author wishes to enter a strong protest against the custom, that is prevalent with many *general practitioners*, of ordering the cold plunge for nervously exhausted and

run-down patients. To say the least, it shows a total ignorance of the action of this bath and a lively disregard of the dangers attendant upon its use in these cases.

Surf Bathing.

This form of hydriatic procedure is, as a rule, limited to those who can reach the seaside, and is rarely indulged in unless the water is warm and pleasant. On the Eastern coast the time of year varies with the latitude, and this is equally true of the Pacific coast, bathing at some places in Southern California and Florida being available during the winter months. To the strong and vigorous sea bathing is one of the most delightful and invigorating of all aquatic sports. It possesses a delightful esthetic side, that enhances the pleasure materially. A fine beach, brilliant sunshine, bright costumes, the roar and rush, the splash and dash of the oncoming "white caps," all promise exhilarating participation, calculated to elevate the spirits and increase the activity of the circulation. Chemically, the ocean is a strong solution of common salt, the following being an analysis of its water:

Chloride of sodium	25.1
Chloride of potassium	.5
Chloride of magnesium	3.5
Sulphate of magnesium	5.78
Sulphate of lime	.15
Carbonate of magnesium	.18
Carbonate of lime	.02
Carbonate of potassium	.23
Iodides and bromides	traces
Organic matter	traces
Water	964.54
Total	1,000

The bather, dressed in a thin bathing attire, with a preliminary promenade in the warm sun, plunges into the rapidly moving water, subjecting the cutaneous surface to the stimulating influence of the waves. It will readily be seen that we have here combined the influence and effect of a percutient hydriatic application, and it is not far amiss to say that surf bathing closely resembles the douche. The author is such a firm believer in the many advantages to be derived from the use of surf bathing that he feels a few words are essential for the government of those who prescribe and use this bath. The water usually ranges from 60° to 75° F.; the maximum duration should be approximately twenty minutes. It has been my personal observation that the action of the bath is materially enhanced by dividing the time of immersion with intervals spent upon the beach in the sunshine and in active exercise. By the repetition of short "dips" in the ocean, extending altogether possibly over three-fourths of an hour's duration, all the influences that go to make up surf



PLATE 9—The Surf—Nature's Dazzle.

bathing are more satisfactory and active in their effects. Here, again, we must not lay all the values that are derived to surf bathing alone, for we have the very best and purest of air, brilliant sunshine, toning and enhancing every tissue and function. Associated with this are the physical activity of the body and the swimming in the water. Those who live in towns, away from the seashore, have always seemed to me to be more especially benefited by surf bathing and its concomitants than those who reside at or near the seashore. To the man and woman living in large cities, cooped up the better part of the year in ill-ventilated and poorly lighted offices, whose skins are inactive and leathery, whose digestion is weak, whose nervous system is let down, there is nothing equal to even a short sojourn of two weeks at the seashore, daily battling with the active surf. To these it is, as near as possible, happiness unrestrained, with the joy of air and earth and water, with the absence of conventionalities and all the latitude that comes with it. This return to the wild and savage life, where the skin is exposed to the sun's rays and to the cold waves, produces a wild exhilaration that starts anew the bounding impulses of life, and brings again to the system that vigor and elasticity that should be the heritage of health and youth. It is just such return to "Nature's own" that enables the denizen of the densely populated centers to return again to the battling and struggling necessities of life. If the individual is strong and powerful it simply renovates and recreates; if anemic and run down, it restores; if weakly, it strengthens. Even in robust individuals, however, but one bath should be taken daily, and in surf bathing, as in all other hydriatic procedures of a tonic character, the writer believes it should be taken before 3 P.M., always on an empty stomach, or certainly not until two hours have elapsed since eating. It is an excellent plan to arrange the bath so that upon leaving the surf the bather can go directly after tobing to his lunch. The bather must avoid entering the ocean while the body is fatigued or chilled, and where the reactive power is poor the plunge in the surf should be of very short duration, not exceeding a minute or two, followed by slow walking in the sun and exercise movements of the arms. If, after dressing from such a bath, a genial glow suffuses itself over the sensitive surface of the body and is succeeded by a pleasing warmth internally, accompanied by a refreshed and invigorated feeling, it is evidence and proof of the salutary influences; but if, instead, there follow a chilliness, languor, headache, irresistible depression and disposition to drowsiness, or any of these, it should be reckoned as important evidence that the bath has not contributed in any material way to the advantage or improvement of the person's health, and that, if persisted in under similar or like conditions, the result will in time prove injurious. If these precautions are observed, both by the vigorous and sickly, much can be gained from a course

of surf bathing, for it will be found that the appetite and digestion improve, the secretions become better in quality and quantity, the skin healthier, the nerves stronger, the mind clearer and the body more active. I am satisfied from no small observation that many persons fritter away the benefit of their summer trip to the seashore by injudicious, improper and excessive indulgence in surf bathing, and at the same time fail to follow those hygienic laws of which "early to bed and late to rise" forms a most excellent basis.

Sea bathing is contraindicated in those cases in which the arterial elasticity for any reason has been changed or lost, as in arteriosclerosis and capillary fibroses; also where the peripheral vessels have ceased to respond to reflex stimuli, or in any case or condition in which the stimulation of the bath would be likely to favor or to produce internal hemorrhage; in organic heart disease, recent rheumatism, cholelithiasis, acute gastro-intestinal or febrile diseases, or any disease whatsoever in which the normal resistance has been so reduced as to make it necessary to protect and guard the patient's forces.

Miscarriage may be caused by bathing when the sea is particularly rough. Sea bathing is also prejudicial to health during the menstrual period. It is worthy of note that otitis media frequently follows bathing in a rough sea, as well as frequent and prolonged exposure in the water.

Swimming Bath.

In this connection it is pertinent to consider the *swimming bath*, which, to a great extent, possesses a similar value to that of the ocean bath. There is no question but what swimming in rivers, ponds, lakes, streams, artificial reservoirs, and the like, is of great value, both as a hygienic and therapeutic procedure. The same rules and laws that govern surf bathing are applicable to swimming in still water, with this difference, that as the water is not moving, and therefore is free from one of the stimulating effects incident to surf bathing, the duration of the swimming bath in ordinary water should be shorter, and as a rule not exceed fifteen minutes.

It is well here, as in surf bathing, to intermit the immersion by exercise between the plunges. In surf bathing and swimming the bather should not remain in the water until he becomes chilled, or until the lips are blue, for where the bath is carried to this extent it is usually succeeded by a feeling of lassitude, chilliness, headache and general discomfort. The presence of these symptoms indicate that the bather has remained too long in the water.

Should cyanosis appear in the lips, the bather must immediately remove the bath costume, if possible step into a foot-tub of hot water, at the same time applying vigorous rubbing to the body with warm dry towels. When reaction is established it should be followed by



Plate 99—Surf Bathing.



Plate 110—Colonial Swimming Pool, Louisville, Ky.

gentle exercise, preferably walking in the sunlight, for fifteen or twenty minutes.

Swimming pools, open to the public, possess some dangers. The rules do not compel a thorough cleansing bath with soap, and even if this were so, the water soon becomes contaminated by surface excretions due to the exercise and from the buccal secretions that are carelessly expectorated into the water. These unhygienic conditions, inseparable from a public pool, are the means of spreading skin, eye and ear diseases. Especially common is a furunculosis of the external auditory meatus and conjunctivitis. This does not occur where lakes, rivers and streams are used.

Mineral Baths.

Medicine from time immemorial has had her follies, and hydrotherapy has likewise not been free from such delusions. Among the prominent hydriatic lapses may be mentioned the following baths: Mineral acids, chloride of calcium, iron, sulphur, tan, bran, malt, glue, milk, whey, blood, wine, horse-ding, guano, oak bark, starch, soap, corrosive sublimate, etc., any one of which has stamped on its face lack of common sense and charlatanry of the purest ray serene. I think it may be stated with practically no fear of contradiction, save by those who operate mineral springs, that there is no evidence whatsoever at hand to substantiate the statements that certain mineral substances dissolved in water, in such infinitesimal amounts as are found in the natural waters, can have any special value to the cutaneous surface. It seems to me that these baths possess value only as they produce the same thermic and other impressions upon the periphery that are to be derived from the use of plain, unmedicated or simple waters. The laity are very apt to be led astray in their estimate of mineral waters and their virtues as an internal beverage and as an external hydriatic weapon against diseases, seeming to forget entirely the major factors of absence from business, freedom from care and worry, open air and pleasant surroundings, all of which tend to produce a rejuvenation of the system, aside from the mineral water.

The author has visited many mineral springs of this kind, and prides himself upon the fact that while he has tasted, he has never used any of the waters, and has secured as much good and benefit from his sojourn as the most eloquent and flannel-mouthed exponent of their accepted virtues. Of course, this does not mean that there are not some springs that possess value, but my observation and experience lead me to believe that those waters naturally heated have given the best results *per se*, which I believe to be due to the fact that patients gain sedative benefits that may be derived from the application of any water at a high temperature. It will be seen that even

in these instances a remnant of a doubt remains. Probably of all mineral baths that are most popularly sought the sulphur bath is the most common, and I believe that no thoughtful man will for a moment entertain the belief that there is the slightest benefit to be obtained from the addition of sulphur to the water used. European hydriatists who practice at the great spas, and who utilize their waters, take a much broader view of this matter than their American contemporaries, a notable instance of which being the Schott brothers, at Nauheim, in Germany. The time is fast approaching when the medical profession should post itself thoroughly regarding this rapidly expanding farce. It does not mean that hydrotherapy shall not be utilized at springs, but that it should be utilized in an intelligent, far-seeing, scientific manner, freed from charlatanry and quackery, and administered to patients based upon a thorough knowledge of the physiological action of thermic values. In this connection it is interesting to note again what has been most frequently referred to in previous sections of this work, that the water contained in the bath is not absorbed by the skin—*ergo*, what is the value of the mineral constituents to the bather? It must be borne in mind that at the Nauheim bath, one of the few mineral baths recommended, it is not the contained mineral so much as the presence of an active, effervescent carbon dioxide gas, which is not absorbed, that does the work, acting through the peripheral nerve terminations in the skin surface.

Douches.

In nearly all of the preceding methods of treatment that we have considered the human hand has taken an active part in the application, but in the douche the physiological effects are obtained by the use of apparatus which drive or throw the water upon the entire or various portions of the skin surface. The many forms of application of hydrotherapy reach their acme in the douche, and this instrument of therapy is the aim and object of most operators, for by its use the most powerful physiological effects may be produced. The douche is the most satisfactory, flexible and adaptable tonic in hydrotherapy, and is capable of producing changes marvelous to those who are unacquainted with its use and effects. It should be noted that in douches we have to deal not alone with thermic impressions upon the surface, but with mechanical effects as well, which are of a perturbating or concussive character, and while this latter plays an important part in the effects of the douche, yet the temperature effect is in reality the most important. It is to be noted in all methods by which water is driven against the human body that its action is strictly limited to the moment of its application, as the water at once flows or falls from the surface. A douche, therefore, is the application of water to the body surface in single or multiple columns or streams at dif-

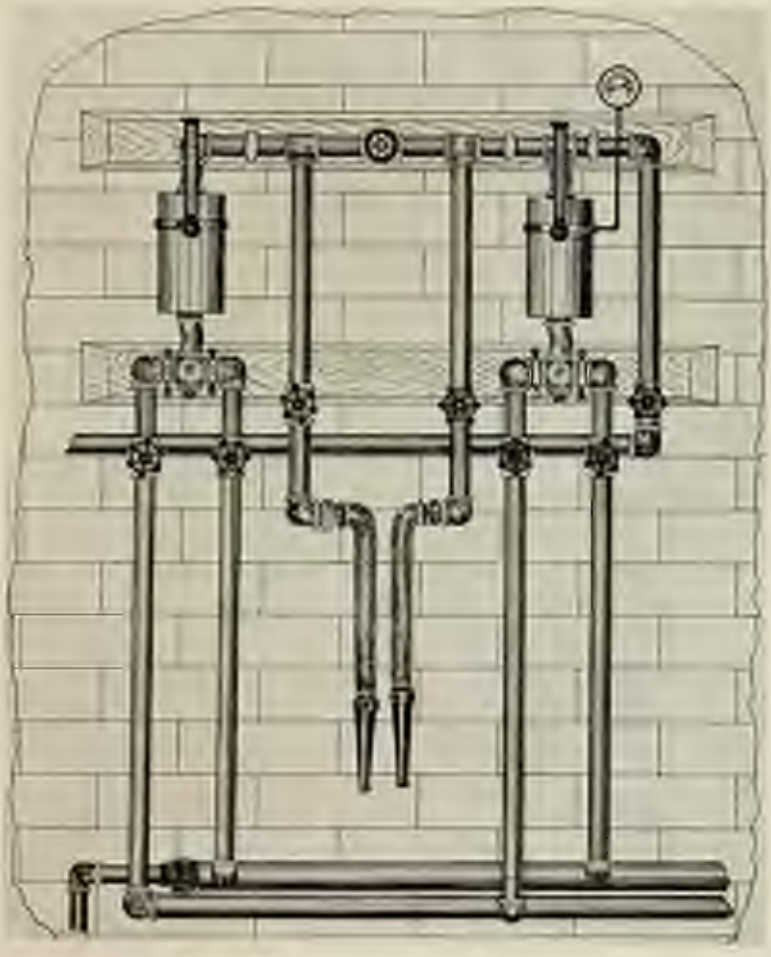


PLATE 101—Author's Double Apparatus

ferent temperatures and under varying degrees of mechanical stimulation, the latter derived from atmospheric pressure. There are different kinds of douches. They may be administered from a nozzle with an opening so fine as to make the application painful, or broad like a fan, or as multiple little streams. Each and every douche may be hot, cold, or may be alternate hot and cold; in the last named the sudden thermic changes enhancing the physiological action of each temperature. In like manner the mechanical stimulation may be of any grade of strength from the mildest to the most powerful. It should, however, be borne in mind that the physiological action of an affusion, the mildest douche, and the jet, the most powerful, is one and the same, the difference in effect lying more particularly in the variations of the method and in the pressure used. Douches are, as a rule, more agreeable to the majority of individuals than the other forms of hydriatic procedure, because by its stimulating mechanical action it, in a brief period, not alone produces its effect, but hastens and increases reaction. For this reason in institutions, sanatoria and hospitals, especially where the chronic invalid is treated, the douche is much employed, not alone for its well-known therapeutic power, but because of its brevity of application, which makes it popular with the patient and saves much valuable time where many are to be served. I am of the opinion that in the douche we have the most powerful and far-reaching of the therapeutic weapons, and one that should be more frequently used. Those who have never used (personally) a powerful douche have missed a pleasant experience, and were physicians to try this measure more frequently upon their *own persons* I am confident they would have less recourse to medicines in chronic diseases and make more use of hydrotherapy. It sets the tissues in a vibration impossible to describe; experienced, it is never forgotten. The writer, after eighteen years' practical experience in a large practice, and in the daily use of hydrotherapy, is at a loss to differentiate physiological distinctions, niceties, and need for separate consideration of "liver, spleen, epigastric, perineal, ascending and descending, etc., douches," so much insisted upon by French and German writers and by some hydriatists in this country. Owing to anatomical differences in structure and its varying vascular distribution, certain reflexes may arise that are different in one place from those in another, but the difference is so small that it can be overlooked in view of the simplicity and clearness that is gained by reducing the subject of douches to its simplest terms.

Following the plan heretofore insisted upon, the writer will give a brief description of each "douche method," its peculiarities and advantages, and will then give the physiological action, therapeutics, etc., of douches in general. I will consider douches under four headings, proceeding from the simpler to the complex and more powerful. Douches are divided as follows:

1. Affusions.
2. Shower or vertical rain bath.
3. Circular rain, horizontal rain, needle or spray bath.
4. Jet douche (jet or fan).

Douches are administered by means of certain attachments that are in connection or conjunction with what is known as the "douche apparatus." In constructing the douche apparatus we should have delivered to it, in pipes not less than one and one-half inches—the author uses two—hot, cold and ice water, under a sufficient pressure to secure satisfactory results. It should be in *direct* connection with both hot and cold water supply, and so arranged that the use of hot and cold water elsewhere will not interfere with its operation. Eighteen years ago the writer constructed a simple and efficient douche apparatus which serves him excellently to this day, and which can be seen in the accompanying cut. This apparatus is attached to the wall, and consists of two separate and distinct divisions, both of which are supplied with the three kinds of water, the left hand division being connected with the circular needle bath, triangle and perineal douche, the right hand one with the jet and fan douches. This apparatus is constructed of one and one and a half inch brass nickel-plated pipes, and the three kinds of water are delivered to the mixing chamber, from which a single pipe conducts the water to the respective pieces of apparatus. The apparatus is so arranged that, in giving the alternate or Scottish douche, hot water may be obtained from one side and cold from the other, the apparatus thus meeting every requirement of a correct treatment apparatus. The mixing chambers are supplied with accurate thermometers, and a gauge shows the amount of pressure employed. With this very simple instrument of precision water may be applied in any form of douche with rapidity, facility and accuracy. The writer has used, and has in his sanatorium, one of Dr. Simon Baruch's douche-tables, a picture of which is shown, and of which its originator has the following to say:

"The douche-table is a box four feet long, three feet high and two feet wide, covered with marble. Enclosed within the box is a combination of pipes connected with the hot and cold water and steam supply on the one hand and a hose with other terminal arrangement on the other. The hot and cold water supply is by the usual contrivance controlled by stop-cocks, the terminal rods and levers of which issue through the opening in the upper portion or slab of the douche-table, as may be seen in the diagram. The outflow pipe, controlled by the stopcock, regulates the pressure of the water, which is plainly indicated upon the gauge. This enables the attendant to arrange any pressure required, either before the douche is administered or while it is flowing upon the body. A thermometer is so arranged that its bulb, incased in an openwork metal tube, lies within the mixer and shows the temperature of the water flowing upon the

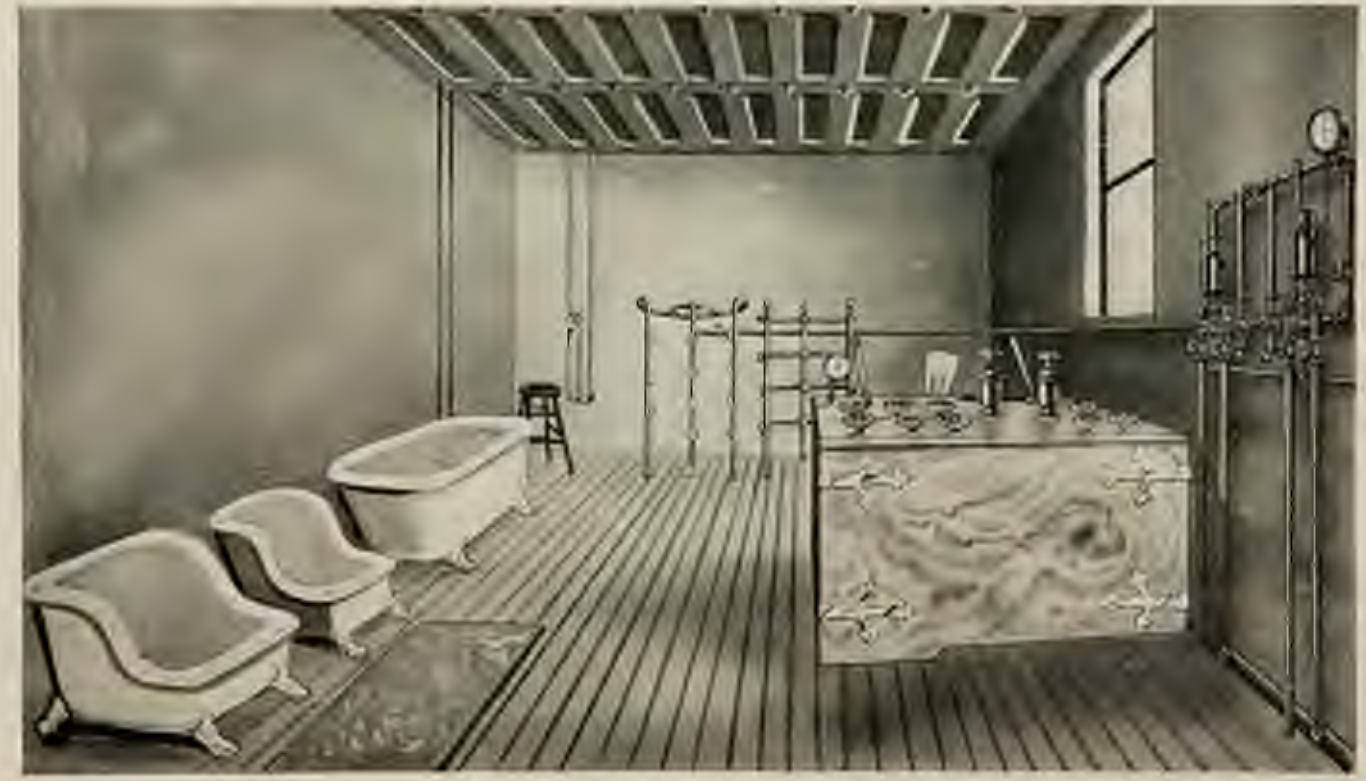


PLATE 308—Hydriatic Room

patient. A second clock furnishes information regarding the duration."

It is from these apparati that the various forms of douches are administered, and which we will now consider, the only exception being the affusion.

Affusion.—The "affusion" is a procedure by which a stream of water issuing from a bucket or pitcher is thrown or falls upon the patient sitting or standing in an empty tub. The writer uses the affusion with comparative rarity, and, as a rule, only in connection with the half bath or for some local effect. It has been his experience that it is best to employ a bucket provided with a partial covering and large opening through which a broad stream of water may be concentrated more or less upon the patient. It will be seen at once that the affusion can be made stronger or weaker according to the temperature of the water and the height from which it falls. It is my custom to generally administer the affusion from 55° to 70° F., and I have found that it is advantageous for the patient to be sitting and to administer it to both the chest and back. This, in connection with the half bath with friction, has been a favorite method of the writer's in treating locomotor ataxia, and to which the reader is referred in the section upon therapeutics. It has been suggested by Barnes that in conditions of coma, delirium and adynamia the patient should sit or recline in water at a temperature of 100° F., and receive the affusion at temperatures varying from 45° to 60°. He says:

"It is this method by which Currie made his remarkable cures in typhus fever, using chiefly sea-water on board the ship. In scarlatina, when the system is overwhelmed with poison, the circulation embarrassed, the skin pale or marble or cyanotic, the respiration shallow, temperature high, pulse rapid and feeble, truly marvelous results may be obtained by the judicious brief use of affusions. Reaction occurs rapidly, and with it come an improved peripheral and general circulation, deepened inspiration, bright countenance and roseate skin. Let not the fear of cold water deter anyone from resorting to cold affusions, 70° to 60° F., in these desperate cases."

It is always a good plan before administering the affusion to have the patient's face and neck thoroughly cooled. There is just a little knack in giving the affusion, and that is to swing the bucket to a sufficient height so as to cause the water to dash against the patient; in feeble patients, where the affusion is applied to the chest, it is well to have the patient break the first part of the stream by placing his hands against the chest wall and then quickly removing them.

Shower Bath.—The shower bath, vertical rain, or rain douche, as it is variously styled, consists of a perforated disk from which a large number of fine streams of water fall upon the patient. This application resembles somewhat the effect of the circular rain or needle

douche, owing to the large quantity of water that flows over the body surface. The temperature effects are practically the same as in all douches, but the mechanical or pressure effects are less than in the next two forms to be considered, although it is greater than in the affusion. The rose should be so arranged that the water can be made to fall upon the head at an angle when this is so desired, as some patients are exceedingly sensitive to water falling straight down upon their head. This is a procedure of considerable value, and is quite a stimulant to the nervous system, and possessing many of the valuable effects of the douche. This is the favorite percutient measure in private homes, and the shower or vertical rain is now a part of nearly every well-kept private bath-room. In sanatoria, as a rule, the rose permit of larger volumes of water under greater pressure than is found in private houses. The shower is a part of the standard apparatus manufactured by companies who deal in plumbing supplies, and is easily obtainable at reasonable prices.

Circular, Horizontal, Rain, Needle or Spray Bath.—In my sanatorium I employ two kinds of circular, needle or rain baths, one of which is the old-style needle bath supplied with semicircular perforated pipe and attached to one of the mixing chambers of the douche apparatus. To the left of it stands a circular needle bath, popularly termed in the institution the "triangle," which was originated by Baruch, and which the author has had in use for a number of years. This consists of three standard upright brass nickel-plated pipes to which are attached four or five rosettes, three inches in diameter, containing approximately fifty fine openings, the three upper rosettes so arranged that the stream of water may be directed downward, so that a person of short height will not receive the volume of water upon the face and head. In the older circular rain bath the writer has obviated this difficulty by the use of three stools of different sizes made of *cedar* wood. The circular rain or needle bath is a very active and powerful procedure, and by its use one is enabled to obtain far-reaching effects. The multitude of fine streams under considerable pressure falling upon a large area of cutaneous surface, stimulate by their thermic and mechanic effects all the structures immediately in contact with the water, and arouse extensive reflex action. It is a milder procedure than the jet douche and a stronger one than the shower bath. This bath has in the writer's hands yielded him some of the most satisfactory results obtainable in the whole field of hydrotherapy, and it would be difficult to substitute as effective a weapon should this be lost to the profession. It is especially valuable for women, many of whom do not stand well the stronger jet douche.

Jet Douche.—The jet douche or "hose," as it is called in the parlance of the bath-room, consists of a hose attached to one of the outlet pipes of the douche apparatus, and to the other end of which is a metal



PLATE 105—Shower Baths



PLATE 106—Affinity in Color



Page 387—Circular Horizontal Bars or Needle Bath

connection to which can be screwed various attachments for modifying the size and shape of the stream delivered to the patient. The jet douche is usually administered through a nozzle, the diameter of the opening ranging from one-fourth to one-half inch. As before stated, the douche apparatus should be so arranged as to possess two of these jets in order that the Scottish douche may be administered. The jet douche is, in the opinion of the writer, from careful clinical observation and from long *personal* experience, the most powerful of all forms of hydriatic treatment. Administered at high or low temperatures, under a strong pressure, it is capable of arousing the most sluggish and intolerant function of the human body. It is a powerful invigorant, revulsive and sorbefacient when administered as a Scottish douche for local conditions, especially of a chronic inflammatory nature, particularly when located in the extremities.

The *fan douche* is nothing more or less than a very simple modification of the jet douche, and while there is a special nozzle or attachment for producing the fan douche, the author would not advise its use, as it is really objectionable rather than beneficial. The simplest way of producing the fan douche is to place the finger over the nozzle of the jet so that the water will fall upon the patient in a broadened and thin stream. In this way certain structures that would be unable to stand the action of the jet douche gain all the value of this application without having sensitive parts subjected to the pain and discomfort that the full jet might produce. In case the temperatures used are too high, and the force of the stream too strong for the human finger to stand, by the use of a small piece of wood, preferably of cedar, the stream may be broken without having the attendant suffer any discomfort from the temperature administered. It is the writer's favorite method to combine the fan and jet douches, using the fan douche upon the chest and the tender walls of the abdomen, and the jet douche upon the spine, back, lower limbs and feet. It is for this reason that I do not advise the use of a special nozzle, as it would compel the removal and reattachment of these nozzles several times, during the interim of which the patient would become chilled, thus robbing him of all the benefits that the douche commands.

The *perineal douche* is a modification of the jet, and is applied through a nozzle directed from the floor, the patient being seated upon a stool through which a hole has been bored to permit the stream to reach the perineum. This douche is of some value in the treatment of sexual weakness, prostatic troubles and hemorrhoids. It should be gently applied at the start and gradually increased in force.

The *Scottish or alternate douche* is simply the alternate application of a hot jet douche followed by a cold jet douche. While it is generally employed as a jet douche, still it may be applied in almost any form of douche. In the application of the Scottish douche it should be

borne in mind that there is, as a rule, a ratio between the application of heat and the application of cold. Roughly speaking, it is usually four or six to one—that is to say, the hot application should, as a rule, be long and the cold application short. Reducing it to time, the hot application should range somewhere between one-half and three minutes, and the cold application from five to thirty seconds. The aim and object of the Scottish douche is to intensify the revulsive effect obtained from both the application of the hot and cold water. Where we have to deal with conditions that are local and which especially affect tissues such as joints, sciatic nerve, etc., an excellent method of treatment is to precede the use of the Scottish douche by a general sweating method. Its application combines all the physiological influences of both the hot and cold douches, and, in fact, rather intensifies their action. It is one of the most powerful absorbents of inflammatory material that can be placed in the hands of the therapeutist. It produces, in addition, a marked mechanical influence. The temperatures usually administered range from 100° to 125° F., while the temperatures of the cold water range between 55° and 70° F.

It may be stated that a *sine qua non* to its successful use is ability to manage and direct the forcible impact of water upon the whole body or any part of it; the operator should be able to control the form, temperature, pressure and duration of the douche. It should be noticed that variations in temperature and pressure are easily distinguished by patients.

Practical common sense will at once see that while there is a difference in the effect of water acting in a concentrated form, as in a jet douche or in the separated multiple little streams of a circular needle douche, yet this is only a difference in degree and extent rather than an ultimate physiologic difference. Douches are usually administered at temperatures ranging from 45° to 120° F., and where they are very hot or very cold they should be of *brief* duration and act as a stimulant, increasing tone and well-being. Hot douches (104° to 110° F.) should not exceed, in general applications, a half to two minutes, preferably as an average one minute, the hotter the douche the briefer the time. Cold douches (45° to 70° F.) should not exceed, in general applications, ten to thirty seconds, preferably as an average fifteen seconds, and likewise should be proportionately briefer the lower the temperature. It is an excellent rule to commence treatment with a temperature of 100° F. for one minute, followed by a reduction to, say, 80° F. for ten seconds, increasing the hot water one degree daily until 104° F. is reached, and reducing the cold water two or three degrees daily until 60° or 50° F. is reached, and in like manner increasing pressure steadily.

Cold temperatures are secured in summer by ice water obtained by passing water through a coil of pipes surrounded by ice. This is



Plate 108—Vaginal Douche Apparatus.



Plate 109—Perineal Douche.

only necessary in summer. In some places water of sufficiently low temperature is obtained by sinking deep wells, thus obviating the trouble and expense of the ice-box.

The jet is usually administered with the patient standing, but if he be quite feeble he may sit. In many cases it is well to combine the different forms of the douche in an application, beginning perhaps with the warm circular needle douche, finishing with the cold fan douche over the body and the cold jet to the spine, legs and feet. Where the entire body is treated we would expect general physiological effects, and where the applications are local purely local and reflex effects. The most pronounced local effects are found in the Scottish douche. The douche should never be administered except upon the order or under the medical direction of a well-trained hydriatist, as it is too vigorous an application for the uninitiated or to be left to careless routine treatment. The jet douche is usually applied to the back first, then the legs and arms, and then slowly broken for the chest and abdomen, and lastly to the feet. Where general effects are desired, and some local effect in an organ is sought, the cold jet should be applied as a finishing application over the part it is desired to most influence. The action of the douche, as in many other measures, is enhanced by some procedure that has for its object the increasing of the cutaneous circulation, the collection of heat upon the surface and the increasing of skin sensitiveness. To this end the wet and dry pack, superheated dry hot air, the hot-air box, steam box, the incandescent electric light, the arc light, etc., are used. After no inconsiderable experience, I feel that the general requirements are more nearly met by the incandescent electric light bath than any other known method, and I give this preference except in special cases. The aim and object of the douche is to bring the patient, as soon as possible, under the influence of low temperatures and high pressure. The favorite method of use, however, is first to give a hot or warm douche, following same by a cold one of brief duration. The douche should always be kept moving, and by so doing many disagreeable sensations of heat or cold will be obviated.

Reaction is more immediate and complete, for the colder water and briefer application, coupled with the mechanical stimulus of the impact, overcomes the depressing effect of the low temperatures; in fact, the skin frequently reddens under the cold water during its application in those whose reaction is well developed. Owing to the limited areas over which various douches play, and the accompanying massage, they do not produce the painful impressions as if the patient was totally immersed in cold water. The author believes that the best results are obtained from brief douches under considerable pressure and thermic change adapted to the individual case. The douche encourages both thermic and circulatory reaction—the former brought about by

rapid cooling of the skin surface, the latter because of the intermittent mechanical vibrations of the stream upon the surface. It will thus be seen that all douches depend for their effects upon six factors, viz.:

1. *Form*—affusion, circular needle, jet.
2. *Temperature*—hot, cold, alternate hot and cold.
3. *Duration*—short or long.
4. *Pressure*—amount of mechanical stimulation.
5. *Distance*—from attendant.
6. *Local and general applications.*

Physiological Action of the Hot Douche.—This has been incidentally considered in the foregoing remarks, but we will now take up and consider in detail the physiological action of the hot douche. The temperatures range from 100° to 125° F., though the latter or higher temperatures are only borne after hydriatic education. Local applications may be made at much higher temperatures than general ones, higher with moving than with still water.

The influence upon *temperature* is to first produce a reddening of the skin owing to the close relation between temperature and vascularity. The temperature of the body is raised if the application is general or a local rise if localized, this increase being due to the prevention of heat elimination and by increasing its production.

Its influence upon *circulation* is active. The first and transient influence is to contract the peripheral blood-vessels, followed almost immediately by dilatation, atonic in character and causing a passive congestion of the skin, which becomes of a cherry-red color. The heart is first slowed, with temporary increased force of pulse beat, but soon it becomes accelerated, due to dilatation of the arterial system in the skin, coincident with perspiration and a lowering of arterial tension. As a reflex effect the internal blood-vessels are contracted. The cerebral blood-vessels may dilate at the start and give a sensation of oppression in the head, of tightness and throbbing. Later the dilated peripheral blood-vessels cause a reflex contraction of the cerebral ones, causing an internal anemia, especially of the brain, demanding in both instances cold applications to the head.

Upon *respiration* the influence is to increase their number, diminish their depth and to produce a slight feeling of weight and oppression upon the chest. Moist heat produces these effects at a much lower temperature than dry heat, and in the latter inhalation of the hot air increases the effects. There is a greater heat loss by exhalation and respiratory activity.

Upon *metabolism*, the most intricate process of vital action, the effect is to increase the action, directly stimulating perspiration, the glandular action of the skin, and increasing the elimination of waste

material by increasing the secretion, elimination and oxidative processes of the body.

Upon the *nervous system* heat is a powerful excitant, and where long continued may lead to exhaustion. Applied to the nerve terminations in the skin, its influence is conveyed to the spinal cord and thence to the heat centers in the medulla, stimulating vital processes. These sensory impressions are of a powerful character, and give rise to myriad reflex effects. After a short time stimulating effects give way to relaxing, sedative and depressing influences, well known to those who use the hot bath. Headache, sense of fullness or band-like feeling about and around the head, giddiness, lightness and cerebral oppression are some of its later effects. Upon the peripheral nerves it is, under low pressure, analgesic, under high pressure stimulant. Muscular nerves are markedly influenced, spasm being overcome and relaxation taking place.

Reaction is transient and is followed by atonic conditions.

Therapeutics of the Hot Douche.—Its principal value is that of a preparatory or alternate to the cold douche, and is rarely used alone. Where we have to deal with superficial tenderness, hyperesthesia, in neuralgia, etc., it sometimes proves of value alone, but the writer has found even in these cases the necessity exists for following their application with carefully graduated cold applications. The hot douche reaches its maximum value in connection with cold percutient measures, and is only valuable in this connection.

Physiological Action of the Cold Douche.—The writer is firmly of the opinion that the cold douche should never be used without the preliminary and preparatory influence of heating procedures or the hot douche. Cold applications of low temperature is the aim of the hydriatist, together with maximum mechanical stimulation.

The action of the cold douche upon *temperature* is to primarily produce a chilling of the surface and contraction of blood-vessels. The capillaries of the skin contract, the flow of blood to the skin is checked. The douche does not reduce systemic temperature, for the system rallies to overcome its effect, the development and production of heat being increased. The temperature of the surface in contact with the cold water may be lowered, but only temporarily. The percussive or mechanical effect of douches lessens the impression of cold, and lower temperatures may be advantageously administered.

Upon the *circulation* the cold douche is decisive and tonic in action. During its immediate application the heart's beat is increased, the pulse is smaller, but the subsequent effect is to lessen the number of beats and to markedly increase the volume of the pulse, while at the same time the flow of blood through the heart is accelerated. There is a rise in blood pressure under its use, but a secondary diminution takes place when the peripheral blood-vessels are filled by reaction.

Immediately under the stream of water the skin becomes blanched, followed by a return of color as the stream moves and is allowed to fall on another part, probably due to the weight or concussion of the water driving the blood out of the tissues. When reaction takes place the blood-vessels moderately dilate, retaining what is called "tone" or tonic reaction, and this in the douche is noticeable even in the smallest blood-vessels. For the maintenance of the general circulation there is nothing, in my opinion, comparable to the cold douche. The quality of the blood and the number of corpuscles are greatly increased after a bath. The douche is always short in duration, thus causing it to act as a general tonic, stimulating the heart's action as well as bodily functions.

Upon *respiration* the cold douche immediately causes an increased and deepened respiratory act, thereby favoring the exchange of gases, with an increased absorption of oxygen and elimination of carbonic acid gas. The sudden impingement of the douche causes the chest movements to be of much greater amplitude. There is a certain amount of sensation of gasping and restriction of breathing, but this can be easily overcome by simply opening the mouth widely. With the absorption of oxygen there is an increase of the general oxidative processes of the body, thus reducing the complex chemical composition of toxins to those simple elements that are easily and rapidly removed from the body.

Upon *metabolism* it is the most powerful of stimulants. It arouses functionation to the highest degree. The douche is eminently a destructo-constructive agent, destroying and removing waste material, first by better oxidative processes induced, and secondarily by the stimulus it gives to excretion. By the better destruction and elimination of toxic waste materials physiological processes are given an opportunity to follow the natural law of reconstruction and repair. Upon chronic metabolic and toxic conditions it is the *summum bonum*. Not only does it increase these processes, but all secretory and glandular organs are aroused, so that the secretion is greater in quantity and better in quality. Because of this action we find that the digestive and assimilative processes become more effective, the appetite is increased, more food taken, digested and assimilated. The lymph current is accelerated in the channels and glands, making this accessory circulation more effective in normal tissue regeneration. Flesh is gained and strength restored. It has been demonstrated by numerous investigators that elimination is greatly increased as well as accelerated, Strasser having shown that all waste products are increasedly removed from the body by the douche. Urea, the purin bodies, nitrogen, uric acid, extractives, etc., are destroyed; the specific gravity of the urine is raised and the liver stimulated to destroy gastro-intestinal poisons.

Upon the *nervous system* the douche exercises an influence



Plate 113—Jet Douche.



Plate 114—Jet Douche to Spine; Patient Should be Farther Away and Stream Straight and Powerful as in Plate 113.

equalled by no other procedure in the domain of therapeutics, and this statement is made with a full appreciation of its meaning. The action of the douche upon the nervous system is brought about by the mechanical and thermic impressions, which impinge in rapid succession upon the peripheral nerve terminations in the skin, energetically stimulating and arousing their action. In the action of the douche upon the various functions of temperature, circulation, metabolism, etc., the nervous system is a large factor in the production of both the immediate and reflex effects, for distant influences depend entirely upon nervous impressions and are eliminated by their action. The reflex influences of neural action are enhanced by the mechanical effect of the impingement of water. The cold douche is tonic in action—a general invigorant, producing a feeling of elation and strength. Immediately after its use sensation is enhanced and the skin becomes hyperesthetic. Reflex excitability is increased, nerve centers are aroused, especially those that preside over neuro-cardio-vascular structures. In its impingement upon the skin the douche gives rise to tactile and other sensations, and in this way differs from other hydriatic measures. Pressure influences the peripheral nerves according to its force, its extent and its variations; it sets in action myriads of reflexes, both afferent and efferent, producing thereby in the economy a new balance in which excesses and defects in function are corrected and physiological labor divided. That it increases nerve force and nerve regeneration is patent daily to those who use it in their practice, it being equally true that it redirects misspent and irregular nerve force into reparative and functionating channels. The most important results obtainable in hydrotherapy are secured by its use with less tax upon the neural and general strength than by any known measure. It is alterative, vitalizing, restorative. Upon the mental functions it increases their activity, acquisitive, productive and reproductive. On many occasions the author has found recourse to the douche one of the most effective and satisfactory methods of relieving mental and physical fatigue and of increasing the activity of his higher mental faculties.

Upon the *muscular system* Maggiora and Vinaj have demonstrated the marked increase in muscular power following the douche, together with increased capacity for work. In a large number of clinical experiments made by the author upon his own person he has confirmed these results; and, furthermore, it has a peculiar neuro-muscular refreshing and invigorating effect, felt for many hours after its application. The motive power of the unstriped muscular tissue is much increased, and this is probably one of the many reasons why the stomach, intestines and other viscera are made more active. The muscular coats of blood-vessels respond with selective activity to its action in connection with vascular and neural effects. By the in-

creased muscular action heat is liberated, toxins and acid products squeezed out, followed by better tissue regeneration.

Therapeutic Application.—The douche is rarely used in acute diseases, but finds its greatest field in chronic affections in which we wish to obtain a controlling influence over circulation, nutrition and nerve tone, for in those conditions accompanied by anemia, poor circulation, malnutrition, nervous and digestive disorders, and against chronic exudates and inflammations, it is a weapon by which we may successfully attack conditions otherwise impossible to reach. In chronic diseases of the chest, in catarrhal states of the bronchi, it stimulates expectoration and facilitates absorption, this latter being especially true of the chronic exudates of pleurisy and pneumonia. In functional and inflammatory diseases of the entire digestive tract results little short of marvelous are obtained by a course of douche treatment. We find that atonic, nervous and secretory disturbances are corrected, appetite and assimilation improved, flesh gained.

In many of the psychoses—melancholia, neurasthenia—of the depressed and general type, in mobility with introspection, in hysteria, in many cases of chronic neuritis, neuralgia, sciatica and other nervous affections, there is no weapon equal to the douche in restorative power. In the chronic rheumatic, whose toxin-laden body and metabolic processes are so warped, the douche sets in vibration the entire economy, and, relieving it of its load, soon enables Nature to assert her wonderful restorative power. Where deposits have taken place in the joints, where stiffness and ankylosis without destruction have taken place, when preceded by the use of superheated dry hot air the alternating or Scottish douche is the method *par excellence*, and soon brings about lessened pain and increased mobility. Where the condition popularly known as "stiff back," stiff neck, or a true myositis exists, where there is muscular soreness after an acute rheumatic attack, the douche proves an absolute panacea.

In those cases of anemia and chlorosis where iron, arsenic and other hematinics fail the douche alone will cure, but in conjunction with these useful drugs the hemoglobin and corpuscles daily increase, a fact frequently demonstrated by me from actual laboratory experience and test. Where the skin is dry and inactive or gray and greasy-like, due to improper condition of its circulation and glandular action, nothing so quickly restores the condition as the stimulating thermic and mechanical action of this form of hydrotherapy. In the sedentary and in those who are unable to take the required amount of open-air exercise, a short course of this form of hydrotherapy once or twice a year or once or twice a week will often add many moons of usefulness and activity to the individual. In the fashionable and dissipated, in those affected with "dyspeptic livers," the douche soon rehabilitates and rejuvenates.



PLATE 117—Shower Bath

It can be used even in feeble cases, for, abstracting no heat and favoring speedy reaction, invigoration, not depression, is its result. In cases of inebriety and the morphine habit the douche occupies one of the highest places in modern methods of treatment, relieving the enslaving thralldom and building up vitality.

In conclusion, it must be again repeated that unless reaction is secured the aim and object of the use of these douches is defeated and the benefit to be gained thereby lost.

Contraindications.—Especial care should be exercised in the use of the douche in the aged, in those suffering from respiratory troubles, and in those affected with arterial sclerosis, aneurism and atheroma. In myelitis, locomotor ataxia, acute neuralgias, multiple neuritis, gastric ulcer, acute gastro-intestinal catarrh, cystitis, acute rheumatism and eruptive diseases, the cold douche is forbidden. While forbidden in the acute phases, in the chronic cases it is useful.

CHAPTER XI.

SPECIAL THERAPEUTICS; INFECTIOUS DISEASES; FEVERS.

The author realizes the shortcomings that are to be found whenever one attempts to condense into a few brief lines a compact statement of a disease or disorder, but he feels that these defects are those of omission rather than commission. It is a regret of his that ample space could not be given to the full and technical description of each disease considered in this section of therapeutics. Were this done, the size and scope of the work would be so changed as to prevent the original purpose being carried out. The brief descriptions are merely intended to refresh the memory of the practitioner and impress the student with the salient points of the why and wherefore that should be kept in mind while perusing the method of treatment. In this way it is believed a better grasp of the subject will be obtained by those who refer to the therapeutic section for reference only. To some it may seem a needless thing to do, but the author believes that it will prove of benefit to all those who are interested in this form of therapeutics.

No attempt has been made in this section to produce any more than what might be termed ordinary "good English," and it may possibly seem to some that certain words have been much overworked; while this may be true, the author feels that, in spite of this, he has done wisely in sacrificing style and beauty of language to plain simplicity and absolute clearness, and with this in view a certain *formula of expression*, as it were, has been adopted, in order that the practitioner and student may very easily and rapidly grasp the meaning and interpret the work. Too often authors are condemned for lack of clearness in directions, that are fogged because they fail to realize that their readers do not comprehend the subject with the facility and ease of specialists and those of well-trained minds. The simple statement that "so-and-so is good in this disease" has been avoided, and an endeavor made to state plainly, simply and concisely not only what method to use, but how to use it, what treatment should follow this, and every detail necessary for the tyro, for the fact remains that nearly 98 per cent. of medical men are tyros in the domain of hydrotherapy. The author has so often experienced this dissatisfaction in the works of others that he has in his own work endeavored not only to remind the reader of the disease in hand in a succinct manner, with a brief pathology, but has tried to suggest what should

be first, what second, etc., *ad infinitum*. It has been his rule that wherever several lines of treatment are suggested, to indicate which has in his experience proved the most satisfactory and efficient; for he has found that many of the measures reputed to be of value have been those handed down in books of this character, copied and re-copied without that investigation and elimination which a practical test must always bear to the theoretical and scientific in a work of this character. In other words, it has been his aim everywhere to suggest that which in *his own experience* has proved of use and value, separating the wheat from the chaff, a labor of some difficulty but of vast importance. In some diseases, such, for example, as Asiatic cholera, he has been compelled to accept what seems to him to be the very best recommendation of several authors whose experience in this line justifies him in believing their suggestions to be of value, but with these few exceptions he has been strictly to the line of his own work, trying to give due value and recognition to the excellent work done by others in this field.

At times it may appear as though there were a great similarity between the treatment of certain diseases, and to this impeachment the author can only plead that, if it be true, it is simply because those treatments have been found equally valuable in both forms or phases of diseased tissue or function. It will, however, probably be seen upon close analysis that real variations exist, although at first glance they might not appear to be present, for it will oftentimes be found that the general plan of treatment having for its object the upbuilding of the nutritional state of the patient should be used in both cases, the variations consisting in such localized treatment as the individual disease may demand, the two going hand in hand, thus constituting a difference.

The author has tried to avoid being too dogmatic, nor has he in any sense reached the opinion that hydrotherapy is the *sole and only* cure to be used. This he *knows to be true*—that hydrotherapy is, of all *single* therapeutic methods, in his opinion, most potent, the remedy *par excellence*; but there are other means and measures that may be used that often aid and assist in restoring cases to health. It were foolish not to adopt them in conjunction with any form of rational therapeutics, and to this end he has frequently suggested a proper dietary, hygiene, exercise, and other treatment that would assist and be supplementary to the action of hydrotherapy. The enthusiast might claim that hydrotherapy alone will cure disease, but in conjunction with other methods its action makes cure more certain, and as the aim in this section is to make the therapeutics of water easily available, successful, and in many instances to enhance other treatment, the author has undertaken the task of enlarging upon the scope of his work in order to make it more accessible and effective.

Every endeavor has been made to steer clear of the bias usually manifested in special works of this kind, and for that reason a clear conception of the modern idea of disease and of the general methods by which the case is managed will probably prove of service.

The author wishes again to state for the benefit of those who never read prefaces that during his active experience of eighteen years he has not been in any sense *limited* to the use of Hydrotherapy, but has had at his beck and call a well-equipped sanatorium, trained nurses, hygiene, diet, gymnastics, massage, mechanical vibration, electrification—galvanic, faradic, static, sinusoidal and high-frequency; light treatments—X-ray, Finsen, incandescent, blue—all that the pharmacopeia can offer—and for this reason he believes he is all the better fitted to discerningly separate the goats from the sheep, to estimate accurately the value of hydrotherapy as compared to other measures of treatment; and should he suggest in many instances other well-known methods in conjunction with hydriatics, it is because experience has taught him their paramount value in these cases.

The busy practitioner will consult this section, and in order to save time each section is made complete. He will find diet lists and associated measures, as well as some medicines, named, the combination of which has given the author much satisfaction. In the index cross-references may prove of value and assistance. In conclusion, it may be stated that a study of the preceding sections has doubtless impressed the reader with the necessity for the correct use of hydrotherapy in disease. He must have realized that this remedy is by all odds the most flexible of his therapeutic equipment, an agent that may be found in any home, which can be applied in hundreds of conditions, provided that the temperature, duration and mechanical effects be carefully studied in relation to the particular case in hand.

Simple Fevers.

There come under the observation of the family physician many cases of simple fever, characterized by a moderate elevation of temperature, free from any contagious or infectious micro-organism, and having their origin from divers causes. They are usually of short duration, and due mostly to disorders of the digestive tract, exposure, "catching cold," or over-exertion, both physical and mental. They usually present fever, gastro-intestinal trouble, headache, lassitude, quick tense pulse, increased respiration, hot skin, scanty urine, etc. In these cases hydrotherapy obtains some of its most gratifying results, for in cottage or castle the means are at hand. Give a calomel and aloin purge, and restrict diet. In sthenic cases do not feed. Urge the drinking of large quantities of water, to the extent of one gallon per diem, which may be flavored with fruits to suit the individual taste. No medicines are needed, as a rule. Commence at once by

using the cold sponge, repeated every two or three hours. During the interim apply the cold abdominal compress at 60° F. for one hour, and repeat after each sponging. I have seen much benefit result from a preliminary use of the hot full bath, as hot as can be borne, followed by wrapping in blankets and the free use of hot water internally. Two hours later use the cold sponge and compress. Where the fever is not promptly controlled by these measures, we can commence the use of the full cold bath every three or four hours at 80°, with friction for five minutes, decreasing the temperature five degrees with each bath and increasing the duration one minute. The great advantage of these measures lies not alone in the relief of the simple febrile process, which it will certainly accomplish, but should the fever mask an infection we have placed our patient in the best possible position, having increased his vital resistance and become well acquainted with his reactive power. Hydrotherapy is the method *par excellence*.

Typhoid Fever.

The importance of fully understanding the method of treating this disease cannot be overrated, as it is the most common, most important, and practically the ever-present of the acute infectious diseases. Typhoid fever, because of its large mortality, because of its frequency and amenability to hydriatic procedures, demands that the physician have a clear conception of the essential conditions to be met, and be possessed of all therapeutic resources to meet the requirement. Typhoid or enteric fever is an acute infectious disease, due to a specific toxin, generated by the typhoid or Eberth bacillus, characterized by symptoms referable to the nervous (headache, stupor, delirium) and gastro-intestinal systems (red tongue, becoming dry and brown, abdominal tenderness, diarrhœa, tympanites), a peculiar eruption upon the skin, rapid prostration and slow convalescence. The constant lesions are found in Peyer's patches, the mesenteric glands and spleen. The disease is excited by the entrance of the bacillus into the alimentary tract by means of contaminated water, milk, ice, meat, celery, lettuce, or other substances. Flies frequently aid in disseminating the disease. Peyer's patches become infiltrated, then necrose, soften and slough, leaving ulcerated surfaces, which in recovery are succeeded by cicatrization. The spleen undergoes analogous changes, except ulceration, and the heart, liver and kidneys are the seat of parenchymatous or glandular changes. From the prodromal to the convalescent stage five essential points are of great interest.

1. The presence and persistence of nervous symptoms, such as malaise, headache, insomnia, delirium, stupor, coma, "typhoid state," etc., etc.

2. A weakening of heart action and a rapid pulse.
3. An elevation of temperature.
4. Failure of elimination.
5. Marked mortality.

Of the complications, hemorrhage and perforation are the most important. Mortality is variously estimated from 14 to 25 per cent. under the "expectant" treatment, which percentage truly assumes an "expectancy" unpleasant to contemplate. Under the various "modified" bathing systems, I am convinced a fair average is 7.5 per cent. While Brand[1] has reported 2,150 cases treated by his strict method, commencing before the fifth day, with 10 deaths, and has collected from German sources 19,017 cases treated by "all kinds of cold baths" with a percentage of 7.8; while many American practitioners have small numbers of cases with no deaths, still it may be said that a rough general percentage of deaths, where the strict method has been employed, ranges, as far as I can estimate same from literature and personal information, between 3 and 4 per cent. This difference of three or four lives per hundred were enough to induce the more frequent use of the full method. The *Medical Times* (1903) says that no drugs are employed at Johns Hopkins Hospital, where they have the largest number of cures.

With this short and condensed epitome, we are ready to consider the treatment of this disease.

The patient should be placed in bed in a quiet, well-ventilated room, the temperature of which should be kept between 60° and 65° F. Avoid draughts. An intelligent and painstaking nurse is an essential element in the successful handling of the case, but frequently this desideratum cannot be obtained, and an obedient layman must be substituted. The bed is best single, of metal, with woven wire mattress, two blankets, a plentiful number of sheets and pillow covers. The drinking-water should be boiled and then cooled in a refrigerator kept in an adjoining room, thus protecting the patient from further infection. The most scrupulous cleanliness must be observed, the bed-pan being used through the entire disease and sterilized with boiling water after its use. The discharges should be disinfected with a solution of chloride of lime or formaldehyde. All utensils must after use, be washed in the disinfectant solution and afterward in very hot water. The nurse should protect herself by using no food, water, glasses, etc., that are used in the room, and should cleanse her hands and forearms scrupulously after each contact. Discharges after disinfection are best buried. Linen must be boiled *before* washing. Diet should be liquid and consist of diluted milk, broths, buttermilk, sour milk (yogart bacillus), and albumen water, which may be flavored with lemon or orange, preferably the

1 Deutsche med. Woch., 1887.



Plate 118—Portable Bath Tub (Mott)

latter. Milk is, by common consent, the best diet, and is more palatable and useful diluted with Vichy water, though lime water may be used. Salt must be added. For a change it may be peptonized or koumyss used. Oyster stew, minus the oysters, is a palatable method. Five ounces is sufficient. I believe in the free administration of cold sterile water—as much as a half-gallon in the twenty-four hours—as it quenches the thirst and removes waste products and toxins. Cushing and Clark[2] gave this amount in small doses, eight ounces every half-hour when awake, while every two hours six ounces of milk and six ounces of albumen water were administered. During the night these latter were given once or twice. They noticed there was less nursing, fewer complications and no deaths. Polyuria was marked, closely corresponding to the fluid ingested. Headache, apathy, restlessness, nocturnal delirium and deafness markedly lessened. The tongue and mouth kept clean and moist, nausea was infrequent, fever remissions present. Toxemia was notably diminished. The author has found in fevers that flavoring the water ingested with fruit juices, lemon, orange, apple, raspberry, etc., enables the patient to drink more freely, in larger quantities, while at the same time these juices act as mild antiseptics and possess a fair amount of nourishment. I am not much of a believer in whisky except in *emergencies*, and believe heart action is better sustained by other measures, as we shall see later, though Baruch administers whisky or brandy just before the Brand bath. One should aim to nourish and bathe at or about the same time, in order to avoid fatiguing and disturbing the patient too often. It is doubtless a good general rule to commence treatment with a calomel purge.

Hydriatic procedures should be at once utilized, before even the diagnosis is made, for no harm can be done bathing febrile patients, and much danger accrues from delay. If in doubt as to diagnosis, we can commence the use of the cold sponge. In order to be effective the surface of the body must be made quite wet. Commence the sponge with water at a temperature of 80° F., and reduce the temperature five degrees each successive application until 60° F. is reached. This ablution may be repeated every two hours if the temperature registers 100° to 101° F. One great advantage of this preliminary hydrotherapeutic treatment is the preparation it gives the patient and the clear index we obtain of his reactive capacity.

If now the diagnosis is made unequivocally of typhoid, the practitioner has four methods to select from—to continue the cold sponge and compress already instituted; the tepid full bath with friction at 85° to 80° F. for fifteen to twenty minutes, followed by the abdominal compress at 60° F. for one hour, change once or twice; the neutral bath at 95° F. for twenty to thirty minutes, with friction, followed by

2 American Journal of the Medical Sciences, March, 1865.

the abdominal compress at 60° F.; the full Brand bath. I do not believe in or recommend packs.

The time has come when the hydriatist must speak with no small voice concerning the use of the cold bath, experience having fully determined its efficiency. The author has never been the victim of typhoid, but should he become so infected would not hesitate one moment upon the method herewith outlined. The strict method laid down by Brand and followed to the letter by medical men who mould opinion in Europe and America is the mainstay of the progressive, honest and painstaking practitioner of to-day. Cabot has shown the great value of the sponge as given in the Massachusetts General Hospital, of its revivifying influence and its temperature-reducing power. Taken as a rule, the patients do not seriously object to the ablution or sponge at 65°, 50° or 40° F., while many object to the strict Brand method. By the strict Brand method I mean the administration of a cold full bath at 65° F. for fifteen minutes, accompanied by friction, whenever the temperature per rectum reaches 102.5°, and described in detail on another page.

It must be said with regret that this method grows slowly with the American profession. It is absolutely essential to use *some* method at the earliest possible moment, and a plan that frequently works well is to start the patient with a full bath at 90° F., three to five minutes' duration, using friction; decrease the temperature two degrees for the next five baths and lengthen the time two minutes until the bath is of a temperature of 80° and fifteen minutes' duration; drop one degree for the next five baths, continuing them fifteen minutes until 75° is reached, and if your patient and family do not object, drop in the same manner to 70° and 65° F. *Never forget to use friction*, though it must not be too severe. In very old and very young persons, 90° F. for ten or fifteen minutes is usually better than the colder bath, which they stand badly, for children have larger skin area to their weight and feebler heat-producing powers. It is not a bad practice to *once* daily *cleanse* the skin of the patient by the use of green soap just before giving one of the baths. These baths should be repeated four times daily. Many authors find the cool enema at 75° to 80° F., once or twice daily, an adjunct, emptying the bowels, removing germs and toxins. Thompson[1] says that if the patient shivers after the bath, give Hoffmann's anodyne, dr. i in aqua camphoræ oz. i. If these measures are followed, and the bath method cautiously introduced, little objection will be encountered, and Americans, professional and lay, gradually educated to what some have very unjustly termed "barbaric procedures." As the maximum febrile temperature begins to decline the temperature of the baths should be gradually raised to 85° or 90° F. During the entire course of the disease the

[1] Medical News, April 8, 1905.



PLATE 119—Brand Bath—First Stage (Cohen's "Physiological Therapeutics").



PLATE 120—Brand Bath—Second Stage (Cohen's "Physiological Therapeutics").

heart may be energized, the circulation improved, and some reduction in temperature secured by the judicious use of the ice-bag over the heart for fifteen to twenty minutes every three or four hours. Its use should never be omitted.

No matter what method is employed, the judicious use of the cold compress enhances the effect of the hydriatic procedure adopted.

A discussion at this point of certain features of the treatment may not be amiss:

1. The nervous system in its entirety, from prodrome to convalescence, feels the brunt of the attack. This is shown by the malaise, headache, insomnia, somnolence, tremor, subsultus, delirium and coma. For this reason the influence exerted by hydriatics, and especially the Brand bath, places them at the fore as the weapon *par excellence*, and those who know from experience rely upon it, so exact and scientific are the results. What, then, is the result of hydriatic applications? Instead of the toxins sweeping over the nervous system and drowning it, the nerve centers, lower and higher, are aroused from their lethargy by the powerful sensory impressions made upon the peripheral nerves, conveyed from the skin to the ganglionic centers first, then to the brain, and as a direct result general vital resistance is increased. In fact, it is a nerve tonic in febrile conditions analogous to the tonic action of the cold douche in chronic maladies. By preventing and overcoming the nervous symptoms it removes some of the most distressing and alarming conditions, and, in addition, tends to shorten the grave period of the disease. Its action in dilating the peripheral blood-vessels causes a powerful fluxion from the brain, cleansing it from the accumulated poisons and giving the nerve centers a chance for rest and recuperation. Great comfort, quiet and refreshing sleep are indications of this bath's favorable action upon the nervous system, and the influence of the bath upon nerve action in its turn increases cardiac action, as shown by slower and better pulse. One of the most gratifying effects is the clearer intellect, thus enabling the patient to intelligently aid in the treatment, a factor of no mean importance.

2. In all the range of medicine and surgery cardiac action and pulse-rate are of vast importance, and their condition and consideration is one of the first problems the practicing physician takes up at the bedside. Like the spectre of Banquo's ghost, the fear of heart failure hovers around the bedside of each and every case in infectious disease, and any method by which this may be averted, by which the pulse and cardiac action are strengthened, is a welcome addition. In the Brand bath we have a therapeutic measure second to none.

Let us see why the heart and pulse weaken in typhoid fever. The cardiac muscle and the blood-vessels connected with it energize

through the action of several mechanisms, the most important of which are its nervous connections with the cerebrum and spinal cord, the ganglia in the heart, along the blood-vessels and in the muscular tissue itself. All of these factors are under the influence of the vasomotor centers and nerves. Enfeeblement and later failure results from the action of the toxins upon the central and ganglionic nervous systems, and a direct influence upon the muscular tissue, producing parenchymatous degeneration. As a result, we have feeble, rapid heart action, loss of tension and filling of the peripheral blood-vessels. If we are to believe the experiments of Passler and Rhemberg, this is due to the influence of the toxin upon the vasomotor centers within the medulla oblongata. There is no denying—and every observer confirms the fact—that in the bath of Brand, accompanied by friction, we have an agent by which the vasomotor centers are stimulated, cardiac nerve action enhanced, muscle tone increased, and blood pressure raised, all of which are clearly shown in clinical work by a fuller, slower and better pulse. Its action upon the vasomotor-neural mechanism is brought about through sensory impressions conveyed from the skin to the nerve centers, arousing them to action, and secondarily by the refreshing and invigorating influence that the contact of the cooled blood has upon the nerve centers, heart muscle and blood-vessels. As we shall later note, the benefit of eliminating toxins must be taken into account. The bedside observer will be quick to note that the pulse may even be small, but it has regained its power and possesses that feeling of normal tension pleasant to the finger-tips of physicians.

3. In a careful review of the extensive literature of hydrotherapy in acute infectious diseases, the author has been struck by the fact that so many writers seem to insist that the temperature-reducing feature is the essential aim of this method, when, in fact, it is subsidiary, though none the less very valuable. It is doubly surprising when we find such masters as Brand, Vogel, Winternitz, Popeschul, Liebermeister, Strümpell, Ziemssen, Baruch, Kellogg, Wilson, Hare, Osler, Tyson, Delafield, Sibler, Welch, Loomis, Shattuck and a host of others, men whose experience is large, urging an entirely different view.

Two factors cause elevation of temperature—increased heat production and lessened dissipation. These are governed by nerve centers whose function it is to regulate those influences which in health and under ordinary conditions would not affect the body or cause a rise in temperature. *Heat production* is increased by the presence of the patient in a warm medium, by muscular contractions, voluntary or involuntary, by the contraction of peripheral blood-vessels and mental effort. *Heat dissipation* depends largely upon the condition of the blood-vessels in the skin (contraction) and the temperature of the



Plate 121—Brand Bath—Third Stage (Cohen's "Physiological Therapeutics").



Plate 122—Brand Bath—Fourth Stage (Cohen's "Physiological Therapeutics").

medium that surrounds the cutaneous surface. In the above two sentences lies the full principles upon which the Brand bath acts.

Let us see what takes place. The patient in a medium of water at 65° F. would suffer practically no heat reduction unless *friction* was used, the loss of heat in the skin being compensated by muscular contractions. By the use of friction, however, the peripheral circulation is much stimulated, the blood-vessels relax and dilate and the blood coming in contact with the cool medium gives up its heat. The cooled blood returning to the interior is replaced by the heated blood, and reduction of temperature is the result. By friction, chilling and tremor are prevented, and a factor in heat production is thus eliminated. It is now apparent why the bath must have a duration of some time in order to accomplish its results, and, further, why friction, with its reactionary effects, is to be avoided *after* the bath.

Temperature elevation is not the bugaboo it was formerly believed to be, present investigation leading one to believe it to be a somewhat conservative process on the part of Nature in her endeavor to combat the poison and destroy the cause of morbid action. By the bath the reparative forces are brought out and the destruction as well as elimination of toxins hastened. This is accomplished by means of no toxic substances or antipyretics introduced into the circulation, which, as Baruch sarcastically remarks, "enable the patient to die without any elevation of temperature." The evaporation of water from a surface reduces temperature, a fact that is utilized in far Eastern climes to cool water. For this reason the patient is allowed to be some little time in the sheet and blanket, being later gently dried.

"A death from typhoid in the first week from excessive temperature or failure of the nervous system is rarely observed; the chief danger lies in the infective process, which undermines the system slowly but surely. To meet this danger, the cold bath is our shield and ever-ready weapon. In mild cases the rise of temperature and pulse is readily combated by it, the resisting power of the disease being feeble. Hence the temperature rises only at long intervals to 103° F., but, whenever it does so rise, the rule should be inexorable: the bath must be administered. Clinical experience demands it, and if we would receive its benefits we must obey the behest. The more nearly we approach the high standard of strict bathing, the more nearly may we approach the low mortality." (Baruch.)

The influence of this bath upon temperature is to reduce same during the first week or ten days only a fraction of a degree, but by the end of the second week we may look for a drop of from two to five degrees after each bath, rising again in two to three hours to its former level.

Febrile disturbances have two accompaniments always—hot dry skin and a concentrated and diminished urine. It is true of the

application of water in general as well as in particular to the disease in hand that these conditions are met and overcome by cold applications. To the *tactus eruditus* the hot, dry and pale skin of the febrile state is a true index to throw open the blood-vessels—"open the pores and produce perspiration." As we have already dwelt upon the dilatation of blood-vessels and increased skin activity due to the cold bath and friction, it is only necessary to state further that with the softening and removal of the débris of dead epithelium, the skin becomes soft, its glands proceed to act and the floodgates of the cutaneous surface are thrown open for the elimination of toxins, which we have shown in previous chapters is quite large.

The urine, diminished in quantity, loaded with toxins of the disease and the detritus of tissue metabolism, gives a fair index of what must be the general condition of the circulating medium. There seems no dispute that these toxins and waste products, many of which are deadly, in turn enhance the general condition and increase the temperature. The ingestion of large quantities of water favors the hydration of these poisons, rendering them more soluble, while the Brand bath, by increasing the action of the kidney, favors their prompt elimination. As a corollary, the respiration being increased, better CO_2 exhalation and oxygen absorption take place, and in the presence of sufficient oxygen these toxins, leucomaines, hydrotoxin products are consumed, rendered more soluble and easily eliminated through the better circulating blood current. Here we do not depart from general hydriatic principles of physiological action, but find that in acute infectious processes the same rule holds good. Cutaneous, respiratory and urinary increase of elimination is the direct result of the hydriatic treatment.

5. The mortality of typhoid fever under expectant treatment prior to 1870 was high, ranging from 24.2 to 32.2 per cent., but in the past decade it has fallen to between 14 and 17 per cent. These percentages are, I believe, fair, and are the result of a search through a vast amount of ancient as well as current literature. Even under "compromise" methods the mortality has dropped, until we can fairly state that it has reached 8 to 10 per cent., while under the strict Brand method the death-rate ranges from 0 to 7.5, a fair average from all sources being, in my opinion, 3 to 4 per cent. These figures have been time and again presented to the profession, and in spite of all this the full method is not as freely adopted as it should be. There is in the American mind an inherent repugnance to cold water even in robust health, a shrinking and shirking that is remarkable to those who love its use. For this reason and for sentimental nonsense the patient and his family would run the risk of the loved one's death rather than submit him to the "terrible ordeal" of a cold bath. It is interesting to note the conclusions of all users of this method that

"after a few baths the patient made no objections." It is much less pathetic to place a patient in a tub of cold water than to place him in a grave. If people will submit to the shock, anesthesia and other suffering of a surgical operation to save the lives of their dearly beloved ones, why should they shrink from the Brand bath? It is the *idea of how disagreeable a cold bath must be*. The method is easy to learn, and if in the Philadelphia and other hospitals colored men and women can learn to give these baths, certainly the Caucasian should regret to be classified below the descendants of Ham.

Secondarily, as a result of increased cardiac action, increased arterial tension, better nerve action and oxidation, the functions of the internal viscera are improved. This is observed in better appetite and capacity on the part of the stomach to digest the food taken. Many foreign observers have so often found capacity in this line as to question whether it was not advisable to give a semi-solid diet; in fact, the control of the patient in this respect may be necessary. Better conditions prevail in the bowel in that diarrhea and tympanites are much reduced by these baths. The liver plays an important rôle, for, standing as it does at the doorway of the portal circulation, it is flooded with toxins that arise from the viscera. Its circulation becomes weak, the organ congested and subject to degeneration. The increased fluxion of blood which the bath sets up empties the vessels of the stagnated and half-paralyzed liver, energizes to renewed activity the poison-benumbed ganglia which control it, arouses to its work the hepatic cell, thus renewing all the functions and maintaining the integrity of this most important viscus. In fevers the number of corpuscles is greatly diminished, consequently the oxygen-carrying power of the blood is proportionately lessened. It is interesting in this connection to recall the fact that the white corpuscles are increased in number to a greater extent than are the red by cold applications. The leucocytes play an important rôle as defenders of the body, in destroying microbes, while the serum destroys bacterial toxins. What other agent known to man is capable of rendering such service as this? Acetanilid and antipyretics of all sorts diminish the blood count instead of increasing it, and thus greatly lessen the oxidizing power of the blood.

Another most important service which the cold bath renders the fever patient is the amelioration of his discomforts. Medical men who have been subjected to this method of treatment while suffering from typhoid and other fevers have unanimously testified to the comfort which it secures. The brown, thickly coated, swollen and parched tongue, the sordes-covered lips and teeth, the catarrh of the stomach and bowels, the tympanites, hemorrhage, flatulence, exhausting diarrhea, pneumonia, myocarditis, headache, mental stupor, nervousness, apprehension, paralysis, the cadaverous, ocher-colored

appearance of the patient, are almost never seen when the cold bath has been administered from the very beginning. In spite of all these advantages, it is often difficult to secure the consent of the family, but the suggestion of Dr. Barker[1] may be adopted, that to "overcome this prejudice he sends some missionary literature or sends the friends of the patient to some family in which the bath has been successfully used. After a few baths no argument is needed. He begins with a temperature of 90°, to secure confidence, and gradually lowers it."

It is frequently urged that it is difficult to get nurses to perform the large amount of labor in the bath treatment, but the nurse who has watched and cared for a case of typhoid, with delirium, stupor, involuntary defecation and urination, will gladly accept the toil and worry of the bath treatment as less trying.

Hydrotherapy is entirely safe when judiciously employed, and its use is free from serious objection. Brand says that all cases coming under treatment before the fifth day should recover. The use of medicinal antipyretics is attended by many objectionable features. In the use of antipyrin and other temperature lowering drugs we have to deal with a depression usually followed by an elevation to a point higher than before. The depression of temperature is short, the heart action is weakened, elimination and oxidation become defective, being followed by a general lessening of mental and nervous power. In my opinion these antipyretic drugs should never be used or substituted for the bath treatment.

The use of alcohol before or after the bath should be here discussed. It is not maintained that preparation for the cold bath is not needed, but rather that there are better methods than by the use of alcohol. The ideal preparation is to be found in the application of heat. If alcohol in any way aids reaction it is not by augmenting the activity of the nerve centers, but by encouraging the relaxation of the surface vessels. Far better is it to start early and by so doing increase the reactive power of the patient, or use temperatures which do not occasion the patient so much discomfort or worry. I have seen this obviated in fevers and other conditions by the preliminary use of heat, as suggested by Kellogg, a hot fomentation to the spine or by hot-water drinking. Alcohol is a toxic drug, and its introduction into a system overloaded with toxins seems to me on its face irrational and illogical. If it has a place, reserve it for the emergencies.

While cold baths may be used with impunity in ordinary cases of fever in which the general resistance of the body is good, and before the vital forces have been depressed by the long continuance of the disease, this is by no means true in cases in which hydriatic treatment has been neglected during the first week or ten days of the

[1] Barker, of St. Louis, Mo.), Therapeutic Gazette, 1894.

malady. To plunge such a patient into a bath at 65° to 70° F. and retain him there for ten or fifteen minutes will most certainly imperil his life. By means of partial cold rubbings applied to different portions of the body successively, the cutaneous circulation may be marvelously improved without increasing, even momentarily, internal congestion. In the management of these grave cases, in which the life of the patient depends so much upon the exact and judicious employment of effective therapeutic procedures, it is important to remember that death in these cases, when attributed to so-called "heart failure," is really due to general collapse of the vital powers. The weak condition of the heart is a true index to the condition of the body as a whole.

Under ordinary circumstances the presence of perspiration is evidence either that the febrile action is subsiding or that nature is doing all that can be done to lower the temperature and eliminate the toxin which is the disturbing element, and when this is the case the patient should be wiped dry before hydriatic measures are made use of.

The presence of a dicrotic pulse and marked weakening of the first sound are indications of an asthenic state of the heart, in which it is wholly unprepared to meet the tremendous demands temporarily made upon it by placing the patient suddenly in cold water. In cyanosis the cold bath of Brand is decidedly contraindicated. This symptom is an indication that the movement of the blood is slowed as the result of cardiac weakness, and the heart is not prepared to sustain the shock of sudden and prolonged contact of cold water with the whole surface of the body, while the internal viscera, already profoundly congested in consequence of the cardiac inefficiency, would be endangered, especially the lungs, liver and spleen.

The management of some of the more important symptoms, aside from the general treatment, is an important element, giving the patient comfort and satisfaction. It must be again reiterated that all symptoms are mitigated and often absent where the full method is used from the start.

Headache.—Wet the hair thoroughly with water at a temperature of 40° F. and apply a cold compress or turban at 40° to 60° F., renewing same as it becomes warm. If very severe, apply sinapism to back of neck and use ice-cap or Leiter coil over compress. Keep room dark and urge patient to drink freely of water. Avoid use of morphine.

Insomnia and Delirium.—These are best met by use of the half pack over abdomen and upper hips at 60° to 65° F., with cold compress to head. Occasional doses of bromides may prove useful.

Diarrhea.—The cold compress on abdomen will do much to prevent this condition, though three or four evacuations daily are not too

many. If actions are foul or fetid, use a high enema of sterile water at 95° F. By this means the bowel is emptied and toxins removed. Avoid the use of medicines if possible. In like manner *constipation* is best treated. An oil enema is sometimes better where the feces are hard.

Tympanites.—Use first a high enema of sterile water or saline solution to empty the bowel of all fermenting material, undigested food and toxins. Oftentimes much gas will be passed through the colon tube. Exercise great gentleness and care in introducing the tube. Look more carefully to the regulation of diet. Then apply a very hot fomentation for three minutes, repeat again and replace by the cold compress. Repeat fomentation and compress every twenty to thirty minutes as needed.

Hemorrhage.—Administer morphine, ½ grain hypodermically, at once, and keep patient perfectly quiet. Give no food at all. Apply ice-bag over right iliac region or ice-cold compress to abdomen. Ice internally with freedom; also fluid extract of ergot every three hours. If less severe, saline solution by hypodermoclysis and lower head of bed. In any event, call in a surgeon in consultation. The mortality of intestinal hemorrhage under the bath treatment is 6 per cent. as against 56 per cent. without the bath.

Cardiac Collapse.—Immediately place an ice-bag over the heart, keeping same in position for twenty minutes. If this is not sufficient, hot fomentations over heart for one-half to one minute, followed by ice-bag, and strychnia or sparteine hypodermically. If baths are being used, raise the temperature; if they have not been used, follow out suggestion for late and neglected cases. Stop baths for a short time. This condition rarely happens under strict methods.

Convalescence should be guarded, and as the patient regains strength the baths are discontinued and tonic hydrotherapy gradually increased. By this means nutrition and assimilation are improved and recovery quickened.

La Grippe—Influenza.

La grippe is now practically co-extensive with civilization. Within the last decade and a half influenza has penetrated to the smallest village and hamlet, its spread having been extremely rapid. I know of no infectio-contagious disease capable of producing such wide-spread havoc, such manifold and remarkably morbid pictures.

The bacillus of influenza, or Pfeiffer's bacillus, possesses interesting features, and produces toxemia, bacteriemia, and inflammation (purulent). The influenza bacteria entering with the air into the respiratory organs settle upon the mucous membrane of the nose, throat and bronchial tubes, where they proceed to develop in enormous

numbers and excrete those poisonous products which arise during their life activity. When they do not penetrate the mucous membrane the symptoms produced are those of a pure toxemia—that is to say, the poison is absorbed and circulating through the system produces distant effects; or the bacilli may penetrate, enter the circulation and cause a true bacteriemia. The bacteria that have entered the circulation may settle in some organ or tissue, causing inflammation, followed by the formation of pus.

The sputum is characteristic, of a greenish-yellow color, is tenacious, thick and adhesive, coming from the nose, throat and upper air-passages. In the sputum we find bacilli in large numbers—in fact, nearly a pure culture, showing as fine filaments, being the smallest bacilli cultivated.

Of all the symptoms attributable to la grippe, we may safely say that those pertaining to the nervous system are predominant, and that this disease produces more organic and functional nervous trouble than any other acute infection. A careful study of the forms of grippe will show that the picture is never complete without a large number of nervous symptoms. Two conditions stand out prominently, owing to their frequency as sequelæ of the attack, these two being adynamia or general debility, and neurasthenia. Nearly every case suffering from grippe experiences in some degree the debilitating influence of its poison, this being shown in the slowness of recovery and the general sense of prostration and incapacity that follows the attack. I draw the distinction between these cases and those presenting the symptoms of true nervous exhaustion or neurasthenia; the former might be more properly called asthenosis. Neurasthenia following the grippe not only possesses the general run of symptoms in this affection, but in my experience has shown a peculiar tendency toward that of a depressed type—in fact, has at times bordered closely on to a psychosis, melancholy in character. These patients are apt to be morbid, and have a fear of the development of further serious disease.

From what has gone before it is easy to see the many dangers of this disease; cases of grippe require careful and considerate handling. The ordinary hygiene of the sick-room must prevail, and in addition the cuspidors should be filled with water in which carbolic acid or chloride of lime has been placed. Prevention is oftentimes worth more than a pound of cure, and for that reason members of the family and friends should not be allowed to kiss the patient, no matter how much their love and affection may lead them to osculate.

The patient should be always provided with an alkaline antiseptic spray, with instructions to wash out the nose and throat every two or three hours; thus the first element in the treatment is met by keeping the upper air-passages moist and open, the antiseptic destroying the

bacillus or preventing its further development. The diet must be liquid, and to those who are strong but little should be administered. In elderly people and in those who are weak and delicate it must be administered every three or four hours. I have a very distinct and clear idea concerning the administration of whisky in conditions of the grippe. I never use it save in cases of heart failure in elderly people, and believe that it does more harm than good, as the action of alcohol is toxic in character and our aim and object is to eliminate poisons and not add them to the already overburdened system.

In the treatment of the acute condition endeavor should be made to combat all tendency toward congestion and inflammation, especially that of the pulmonary and cerebral systems. Every effort should be made to reduce functional activity and drain the blood from them to the cutaneous circulation, this being best secured by maintaining warmth and activity of the skin surface. We can favor sweating by first administering a hot full dry pack for half an hour, followed by the cold sponge rapidly performed. This may be repeated as often as every three hours, and as the patient progresses the time between should be lengthened. In sanatoria it is much more satisfactory to administer the electric light bath in bed until perspiration takes place, followed by rapid cold sponging. Superheated dry hot air, body apparatus, used promptly in the beginning, at 250° to 300° F., for twenty to forty minutes, followed by cold sponge (65° F.) or horizontal rain or circular bath at 75° F. for one-fourth minute, often cuts short the disease. When this cannot be utilized, the hot full bath at 102° to 104° F. for ten minutes, followed by a hot full dry pack, will be found serviceable. This may be administered once or twice daily during the acute stage. It may be followed by the cold sponge, rapidly performed. Another method of stimulating the vital resistance is the use of the full wet pack, commencing at a temperature of 90° F., for thirty minutes, repeating every four hours. Reduce the temperature five degrees and increase the duration ten minutes until one hour is reached. Care must be taken in the administration of all of these methods to avoid general chilling of the cutaneous surface.

With the subsidence of the acute manifestations of the disease our aim should be to maintain the general vitality by all known methods. As soon as possible place the patient upon general measures. Commence with the daily use of the electric light bath, or hot-air bath, until perspiration takes place, followed by the dripping sheet for three minutes at 70° F. with vigorous friction; reduce two degrees with each application until 60° is reached. As soon as the reaction of the patient has been fully developed we may proceed to the use of the electric light bath, full strength, until free perspiration ensues. Follow this by the horizontal or circular rain bath at 104° F. for one and one-half minutes, reduced to 70° for half a minute, pressure

twenty pounds. Reduce temperature one degree daily until 60° F. is reached, and increase pressure two pounds daily until thirty pounds is registered. As soon as the patient begins to respond we may administer the following: Electric light bath until free perspiration takes place, followed by the horizontal or circular rain bath for one and a half minutes at 100° to 104° F., twenty pounds, followed by the fan douche for one-half minute to the entire body, jet douche to the spine and lower limbs for one-fourth minute, commencing at a temperature of 70°, reducing two degrees at each treatment until 60° is reached, and increasing the pressure two pounds until thirty pounds is registered. Should we have to deal with any of the inflammatory or other troubles of the intestines, that are liable to follow in the wake of this most pernicious disease, we may apply the Scottish fan douche to the abdominal wall, in conjunction with other general hydrotherapeutic treatment. Where bronchitis or pleurisy develop these should be met according to the principles laid down under the treatment of these conditions, whether they are caused by the grippe or not.

Malarial Fever; Intermittent; Remittent; Cachexia.

This is an infectious fever, intermittent or remittent in type, characterized by the presence of chills, fever, anemia, and enlargement of the spleen. The exciting cause is the *Haematozoon malariæ* of Laveran, which gains access to the human body through the bites of mosquitoes of the genus anopheles. These mosquitoes breed in districts that are marshy, their greatest activity being a period when the temperature is high, humidity present, and an absence of high winds. The mosquito is most predatory at night, a fact recognized in those districts. The various forms of chill and fever are well known, and occur at varying periods, dependent upon the development of sporulation of the parasite. As the spores are discharged into the blood-stream the chill takes place. Flagellated organisms are sometimes observed. The diagnosis of malaria should be made by the use of the microscope, though dependence is not to be placed upon the stained specimen, for in them the plasmodium is often absent, is influenced by quinine and the time the blood is taken. For a number of years I have depended upon the examination of the fresh blood and the presence of pigmented white corpuscles for a diagnosis, and believe it to be an index more constant than any other I have used. The technique is simple, requiring but little time and trouble. Patrick Manson says that a pigmented white cell can only mean (with two rare exceptions) malaria, and that if there be malaria present there will always be pigmentation. There is disintegration of the blood cells in the acute and enlargement of the spleen in the chronic forms. Preventive measures lie largely in the hands of local health

officers, and should be directed to the draining of marshes and ponds, or, where this is impossible, the covering of such marshes and ponds with crude petroleum. In districts where malaria abounds the drinking-water must be filtered and boiled, the residents should avoid sleeping near the ground, and screen their houses. Persons should not sit, in the evening during spring and summer, where they can be bitten by the mosquito. Where screens cannot be obtained ordinary netting is useful. Recent Italian investigations have shown that five to ten grains of quinine daily is a protective of great value. "Quinine," say Marchiafava and Bignami,[1] "acts upon the malarial parasites in that phase of their life in which they are nourished and developed, when nutritive activities cease by an arrest of the transformation of hemoglobin into pigment; when the reproductive stage begins, then quinine is ineffectual in action." For this reason, in these cases the quinia should be administered three to six hours before the attack, for three to four days, and repeated every seventh day for a month or six weeks.

Hydrotherapy is of great value in malarial fevers owing to its powerful reconstructive effects upon the vital forces, its ability to increase the number and activity of the white and red corpuscles, to overcome the anemia, to favor elimination and general functional activity. The writer has had such ample demonstration of these facts as to assert the above without fear of contradiction. The treatment resolves itself into that of the attack and the interparoxysmal period. It is an excellent rule to commence with a calomel purge, five grains, with sodium bicarbonate. During the chill, administer hot drinks (water or lemonade), wrap the patient in warm blankets, put hot water bags to feet and sides, and use no cold hydriatic applications. The hot full bath (102° to 104° F.) for ten to fifteen minutes, or the hot dry pack, or hot wet blanket pack, may be employed. With the cessation of the chill and the commencement of the hot stage the temperature rises, and we may now gratify the patient by allowing him to drink freely of cold water. We may now wait until this stage has lasted an hour, and if at this time the temperature has not fallen, and no signs of sweating being present, use the cold sponge, 50° to 60° F., taking care to avoid chilling the patient by drying each part thoroughly. When sweating takes place, wipe with a cloth until dry, and follow by rapid sponge with hot water, drying carefully thereafter. In the remittent type we may employ the same general medication and cold sponging, such as has been suggested in typhoid fever. The great advantage of hydrotherapy in malaria is during the interparoxysmal period, during which time we must strain every nerve to prevent recurrence by the judicious administration of quinine, and

[1] Marchiafava and Bignami: "Malaria," Twentieth Century Practice of Medicine, Vol. VII, p. 171.

the use of iron and arsenic as tonics. Always insist on free drinking of water. If the patient is weak and confined to bed, continue with the use of the cold sponge, and in addition administer the dripping sheet at 50° to 60° F. for three minutes *once or twice* daily. If there is reason to fear another attack, give the full dry pack for thirty to forty minutes an hour before expected chill, together with hot-water drinking, or we may use the full hot bath (103° to 104° F.) for ten to fifteen minutes. As soon as the patient is up and about, adopt eliminant and tonic measures. Give the electric light bath, full strength, three to five minutes, the vapor five to ten minutes, or superheated hot air ten to fifteen minutes, or dry full pack until free sweating ensues. Follow this with dripping sheet, 50° F., for three minutes, or the horizontal or circular rain bath or the jet douche. The rain bath may be given at 100° for one minute, pressure twenty pounds, reduced to 50° for ten or fifteen seconds, increasing pressure and decreasing temperature daily. In like manner the jet must be graduated. Where the spleen or liver is enlarged the alternate or Scottish douche should be applied over the region of these viscera with temperatures ranging from 110° to 50° F., under a pressure of fifteen to twenty pounds, half minute for the hot, five to ten seconds for the cold, repeated two or three times.

In the malarial cachexia or chronic malarial poisoning, a condition very commonly found, and in which the patient is anemic, his circulation poor, skin, conjunctiva and mucous membranes jaundiced, his spleen enlarged, weakness and emaciation present, temperature subnormal, with occasional febrile attacks, hydrotherapy is practically a panacea. I have had a most extensive experience with these cases, and feel certain of giving relief by hydriatic measures alone, though I generally administer iron, quinine, arsenic and strychnia. There is no question that water judiciously applied does the work, for as a rule the sufferer has already run the gamut of well-known medicinal remedies before utilizing hydrotherapy. It is marvelous sometimes to see the change wrought by a few weeks' treatment used as above (interparoxysmal period). Where hydriatics are used, smaller doses of quinine and tonics become effective, due to the better assimilation of the drugs, a fact frequently noticeable in a few days. In the pernicious forms it may also be used with benefit upon the principles laid down in the management of the ordinary types.

Dengue fever is an acute, febrile, epidemic disease, characterized by a remitting fever, severe pains in the joints and muscles and a peculiar eruption. Its cause is unknown, but seems to be closely associated with atmospheric conditions. Its treatment by hydrotherapy is essentially that of malarial fever.

Measles.

Rubeola is an acute contagious disease, characterized by fever, a crimson, mottled, papular eruption, terminating in branny desquamation and catarrhal inflammation of the naso-broncho-pulmonary mucous membrane. Its origin is an unknown micro-organism, found mostly in the respiratory tract, having a peculiar affinity for children and transmitted largely through the clothes, one attack usually preventing subsequent ones. Uncomplicated cases recover, the most serious danger being from lung involvement. Measles is a simple disease, requiring isolation, rest in bed and protection from draughts, children being especially sensitive and bearing heat abstraction poorly. They may drink freely of demulcent drinks, flaxseed or slippery-elm tea, strained raspberry water, orangeade, all of which are best sweetened with saccharine. In the milder forms, where the temperature is not above 103° F., the sponge bath may be used at 95° quickly done, avoiding friction, or the full warm bath at 98° for ten minutes repeated every four or six hours. This bath may be all that is necessary, but where there are pulmonary complications these will be best met by using the full warm bath for ten minutes, followed by the affusion (see scarlet fever) at 80° F., reducing the latter to 70° F. This must be brief and care taken afterward to prevent heat abstraction. If the temperature remains at 103° F., use the abdominal compress or half pack at 70° F. between the baths. These baths should improve cough and induce sleep. Where cerebral complications exist (delirium, jactitation, convulsions) due to toxemia, use the full hot bath (110° to 115° F.) for ten minutes, followed by an affusion at 75° F., directed to the neck, chest and spine, repeating every four to six hours. Foreign authorities consider cold baths the more efficient measure, and believe that the toxemia is best combated and pulmonary complications more favorably influenced by their use. The pharyngeal irritation is met by the throat compress, steam inhalations and hot alkaline gargles. Bronchial complications are so frequently present, and being the one serious complication, demand attention. In this condition use the chest compress at 80° every hour, or a cold sponge to chest at 60° F., twice or thrice daily. If eruption is delayed the hot bath is best.

German measles are treated in the same manner. In both diseases medicines are rarely needed.

Chicken Pox.

Varicella is a mild contagious febrile affection, characterized by a vesicular eruption, which early dries up and falls off, and moderate fever. Its origin is unknown, but is presumably microbic. Its termination is nearly always favorable. The use of the neutral bath twenty

to thirty minutes twice daily during the eruption and tonic measures during convalescence are indicated.

Whooping-Cough.

Pertussis is an acute infectious disease, characterized by a convulsive cough, associated with catarrh of the air-passages. Its origin is from an unknown organism associated with the sputum. Attacks render one immune. Isolation should be practiced, though on bright sunshiny days the patient may go out, care being taken to avoid catching cold. The nose and throat should be sprayed with Dobell's solution and inhalations practiced. There is no question but what the disease can be shortened and the patient made more comfortable by the use of hydriatic measures. The dripping sheet, commencing at 90° and gradually reduced to 65° F. for two to three minutes twice daily, or the cold sponge reduced in a similar manner to 60° F. will enhance the child's vital resistance. These measures may be preceded by the neutral bath for twenty to thirty minutes, or by a general cleansing bath. The child should be urged to drink freely of plain water, as much as half to three quarters of a gallon daily. The water may be flavored with orange, lemon, strawberry or raspberry juice.

Intense cough may be relieved by the use of the chest compress for twenty to thirty minutes, repeated every four hours. If the throat is irritated the throat compress should be worn. During convalescence tonic measures must be continued, utilizing the dripping sheet as before or the electric light bath till perspiration, followed by the horizontal or circular rain bath at 100° to 102° F., for one to one and one-half minutes, reduced to 70° F. for ten seconds. Children can, as a rule, be induced to take this treatment nicely. I have succeeded with children as young as five years.

Scarlet Fever.

An acute, self-limited, contagio-infectious disease, characterized by high temperatures, rapid pulse, a diffuse scarlet rash or eruption, terminating in desquamation, inflammation of mouth, throat, and frequently grave nervous phenomena. Its origin is in an undiscovered micro-organism, peculiarly virulent, long-lived, and most frequently conveyed in the scaly particles that adhere to clothes, food, etc., and entering by the respiratory organs. Children are peculiarly susceptible, though an attack usually renders one immune. The symptoms are too well known to mention. It is a disease so frequently destructive to life as to warrant the practitioner in being cautious, the mortality ranging from 10 to 30 per cent. It is frequently followed by grave sequelæ. The toxic agent cannot be neutralized,

although antistreptococcic serum has been used with some benefit. The toxin must be combated by those agents that secure general vitalizing effects, for by increasing the vital margin the effects of the disease may be lessened and serious complications averted. The disease being self-limited, kidney and skin action must be maintained to remove the toxins. In grave cases the diffuse dermatitis and suppressed skin action require constant attention, and this, together with kidney action and support of the heart, is the tripod of essentials best met by hydriatic measures. Isolate the patient, keep quiet in bed and freely ventilate the room. Diet is liquid, principally milk. Complete disinfection of all articles used. During the prodromes commence with a calomel and soda purge and the cold sponge at 80° F., reducing each time three to five degrees until 60° F. is reached. Induce the patient to drink freely of plain, sterilized or carbonated waters, taking half to three-fourths of a gallon in the twenty-four hours. Keep mouth, nose and throat antiseptic by means of hydrogen peroxide, alkaline or boric acid washes.

"In the prodromal stage of scarlatina, ere a diagnosis can be clearly established, and in those cases in which the eruption is imperfect, with or without high temperature, the chief brunt of the disease is borne by the heart, as evidenced by feeble, rapid, and compressible pulse, mottled or cyanotic skin, and apathy. Here cold affusions afford most valuable resource. A full bath of 100° F., if the body temperature is not above this point, or of 90° F. if above it, will in five or ten minutes allay the nervous manifestations, convulsions, twitchings, etc. When these are accompanied by feeble heart action, the child should be held semi-recumbent by one attendant, while another pours two or four basinfuls of water at 60° or less over the head and shoulders. After he is dried and well rubbed, the patient is placed between blankets to aid reaction. The affusion may be repeated hourly if necessary, the water being reduced in temperature five degrees each time, and the application being made briefer. The change is often marvelous. The cutaneous congestion due to imperfect cardiac propulsion gives way to a bright-hued congestion, which relieves the laboring heart; the patient falls into a refreshing slumber. Even if the temperature rises, sleep should not be interrupted unless the pulse indicates heart failure." (Kellogg.)

After the eruption has become fully established we may use the full bath at 95° F., gradually cooled to 90° F. for five minutes, the temperature being reduced one or two degrees at each bath until 80° F. is reached. Where for any reason this is impossible or declined, we may continue the use of the cool sponging or substitute the full hot bath. Commence at a neutral temperature of 94° F., gradually add hotter and hotter water until the little patient complains. This bath is, as a rule, peculiarly grateful to these cases, and is rarely objected to by members of the family, for to them it does not seem "to drive the rash in."

Keep the cool turban on the head and sponge the face with cold water during the bath, thereby securing comfort, reflexly stimulating the heart and preventing syncope. Its duration should at the start be fifteen minutes and gradually increased to half an hour. Remove the child to warm woolen blankets, in which he is to remain for thirty to sixty minutes, and induce to drink freely of water. The author has found children to take kindly to demulcent drinks (slippery elm, flaxseed water) sweetened and then strained, or an orangeade in which a small amount of potassium citrate has been dissolved, not sufficient to mar the taste; if this disagrees sweeten with saccharine. This will promote free diuresis, "lift the load" off the kidney and secure the toxic elimination so much to be desired. Watch the urine for albumin, blood and casts, and when this occurs take great care in all hydriatic procedures that the patient does not get chilled. It is conceded that cool sponging and baths are best in the earlier stages, and in the later stages the hot, because of their action in preventing uremic complications. In the first stages we find the cold sponge and baths acting as an invigorant to the nervous system, as an antipyretic, sedative and heart tonic, and in my opinion in enhancing the resistive power of the organism as to act as a preventative of subsequent complications. They should be repeated four to six times daily as a rule.

Certain clinical conditions or complications need consideration. *Heart failure* (weakness, endo- or pericarditis) is best met by means of the ice-bag applied to the precordia for fifteen or twenty minutes every two hours. Where the condition is serious, remove at end of fifteen minutes and apply hot fomentation for thirty seconds and re-apply the ice-bag. By this means the reflex effects of the ice are enhanced, for when the skin becomes chilled nerve impulses are lessened and the benefits that are to be derived from its use lost. In case of vomiting, a hot fomentation for ten minutes, repeated once, followed by ice-bag over stomach, will relieve. Cold carbonated water or small pieces of ice can be taken internally at the same time. *Diarrhea* is best controlled by enemata of sterile water at 80° F. after each evacuation. *Convulsions*, tremors, and other nervous manifestations are to be met by the use of general hydriatic measures, especially the full hot bath, followed by a cold coil-cap applied to the head over a compress of gauze. Keep bowels well open, and, if necessary, try the bromides.

For the *pharyngitis*, tonsilitis, etc., the author's throat compress will be found serviceable, together with the internal use of pellets of ice. Steam inhalations or the use of hot gargles of alkaline water give much relief.

For *nephritis*, urinary suppression, etc., use copious water-drinking, the hot full bath followed by blanket pack for one hour. This bath

under these conditions should be raised to 110° to 115° F., duration ten to fifteen minutes. Repeat every four hours.

For *convalescence* institute some tonic hydriatic measure—dripping sheet, half bath, horizontal rain, etc. Precede their use by the electric light bath, and see that full reaction is attained. General roborant tonics—iron, quinia, strychnia, hypo- and glycero-phosphates—are indicated.

Diphtheria.

Diphtheria is an acute specific constitutional disease, both epidemic and contagious, characterized by a local exudation, fever, great prostration of the vital powers, albuminuria and various paralytic sequelæ. Its origin is a specific micro-organism, the Klebs-Loeffler bacillus, the toxin of which, generated in the course of its growth, produces the symptoms of the disease. It grows luxuriantly on the secretions of the upper air-passages, and is breathed freely into the atmosphere, adhering to all objects, thus requiring careful disinfection. The prognosis is always grave, the mortality running about 10 to 12 per cent. Moderate exudate, low fever and good constitution are favorable. The seriousness of the disease demands that we shall from the start use every measure that will prevent the formation, eliminate the toxin and conserve the energy and strength of the patient. Remove all objects from the room, place the patient in bed, and keep the room well ventilated at a temperature of 70° F., the air of which is rendered moist by means of a steam kettle. The diet liquid, milk, broth, eggs, albumen-orange solution, etc. Tincture chloride of iron is indicated. The nose and throat should be swabbed with hydrogen peroxide, 50 per cent. solution, and sprayed with hot Dobell's solution frequently. All attendants should wear clothes of washable material. Carefully sterilize utensils, dejecta, etc., and cleanse the hands in antiseptics after each contact. To increase the vital strength of the patient and to prevent the loss of valuable strength, commence with the cold sponge at 60° F., repeating this procedure three or four times daily if the temperature is high. Should the temperature be subnormal, give a short full hot bath, or a hot fomentation to the spine, followed by the cold sponge. The local condition is best met by the use of a hot fomentation for ten or fifteen minutes, followed by the cold throat compress, removing the compress frequently and repeating the fomentation every two hours, in connection with steam inhalation or hot-water gargles of phenol. Copious water-drinking of sterilized or carbonated waters. In threatened suffocation *do not try* any hydriatic measure. Intubate or perform tracheotomy. Therapeutic nihilism and *sole* dependence on antitoxin has sacrificed lives; utilize all measures.

Cardiac collapse calls for hot fomentation for one-half to one

minute to the precordia, followed by the ice-bag for fifteen minutes, constantly repeated if necessary, or in milder cases every hour.

For the *nephritis* use full hot baths, commencing at a temperature of 100° F. and rapidly increasing to 110° F., or toleration. Keep cool compress or ice-bag on head, and sponge face with cold water while in tub. Remove to dry full pack for thirty to sixty minutes. Should neuritis, due to the toxins, develop, it must be treated as such. Hot applications are valuable during the painful stage, though this is rather difficult to use in palatal trouble; inhalations and hot throat compress; rest of the part until inflammation has subsided. The resulting paralysis must be treated by local electric light baths, followed by cold applications; the galvanic current to stimulate muscular contractions, massage, gymnastics, and later the sinusoidal current.

Convalescence requires great care and watchfulness, rest in bed, gradual resumption of sitting and later standing posture. Continue the cold sponging and the use of the ice-bag to the precordia, administering iron, quinine and strychnia internally. Feeding is essential to combat the adynamia and anemia. Later we commence the use of the dripping sheet at 65° F. for three minutes, with good friction night and morning; then general roborant and reconstructive measures, such as electric light bath, until sweating, followed by the dripping sheet as above; next the half bath at 65° F. for two to five minutes, then the horizontal rain bath at 100° F. for one minute, followed by the same at 65° F. for fifteen seconds, pressure twenty pounds.

Mumps.

Parotitis is an acute infectious disease characterized by swelling of one or both of the parotid glands and other salivary glands, attended with fever, pain, swelling and disorder of the function of the glands. There is a strong tendency to metastasis to the testes and ovaries. Atrophy rarely follows. Its origin is a specific poison, probably microbic, is epidemic, males suffering mostly. Prognosis is favorable. In simple cases the ordinary hygienic rules and measures, isolation and liquid diet, are all the measures that are needed. Rest must be insisted on as a preventive of orchitis and oöphoritis. Cold water drinking and the use of the cold sponge at 65° to 50° F., two or three times daily, will give much comfort and reduce the fever. Apply fomentations every two or three hours to the affected glands for ten minutes, remove and place over them the cold compress at 50° to 60° F., repeating this latter every twenty minutes, if necessary, or place an ice-bag over the compress. Keep this treatment up until active inflammation subsides. In case of orchitis, ovaritis or inflammation of the mammæ, do not interfere too actively, but apply same treatment as to parotid gland, being careful in the male to embrace entire genital organs, as well as inner thighs; in the female make applica-

tions to the ovarian region or breasts. A very hot foot-bath (110° to 120° F.) is of value as a derivative. If pain in testicle is excruciating, a cold solution of lead and opium wash may be used on compress. Where males are well grown a suspensory is at times advisable.

Convalescence is aided by tonic hydriatic methods enumerated under other heads.

Erysipelas.

Erysipelas is an acute specific, infectious disease, characterized by a peculiar inflammation of the skin, generally of the neck and face, with febrile reaction. It affects the lymphatic vessels and glands, tends to produce serous infiltration and suppuration of the areolar tissue. Its origin is microbic, due to the streptococcus erysipelatus, generally entering through some break or abrasion of the skin or mucous membranes of the nose. It is essentially a septic inflammation. The general indications of isolation and sterilization of clothes, etc., should be observed. Internally the tincture of the chloride of iron in large doses (10 to 30 drops) and quinine (grs. 1 to 5) every three hours, should be administered. Its extension is sometimes stopped by using tincture of iodine or solid stick nitrate of silver to the periphery of the inflammation. Antistreptococcus serum has yielded good results. Hydriatic measures resolve themselves into the use of those general roborant cold measures that will increase the margin of vitality, this being especially true in those who have been otherwise septic (puerperal) and in alcoholics. We may use the full cold bath or full cold pack, commencing at 80° F. and gradually reducing each pack until 65° F. is reached. Duration fifteen to thirty minutes.

The best measure, in the writer's opinion, is the cold sponge applied at 60° F. every three hours, which will be found strengthening, refreshing, invigorating and temperature-reducing. Local measures are of great value. During the early stages of the disease the cold compress dipped in water at 50° to 60° F., containing two drachms of carbolic acid to the pint, should be applied to the area affected every fifteen to twenty minutes. Hebra has used continuous cold in these cases with much benefit. *Ice* compresses and *ice-bags* should be *avoided*, for fear of sloughing or gangrene. When the inflammation subsides and extension has ceased, the time of application may be lengthened, or a fomentation for one-half to one minute, followed by the cold compress, utilized. In case of vomiting, pellets of ice internally, the ice-bag over the stomach, or the half pack may be employed. Free drinking of water at all times. Should nephritis develop, use the full hot bath, commencing at 96° F., gradually increasing the temperature to toleration for fifteen to thirty minutes, followed by the full dry blanket pack for one hour. Keep a cold turban on head and sponge face during bath to secure comfort and prevent

fainting. At the start its duration should be fifteen minutes, increased to half an hour.

Remove to warm woolen blankets, in which the patient should remain for thirty to sixty minutes, and induce to drink freely of demulcent drinks. This bath produces free diuresis, diaphoresis, and relieves the kidney of much work. If heart action becomes feeble, peri- or endocarditis develop, apply the ice-bag to the precordia for ten minutes every hour or two, as the case demands. Delirium calls for the ice-bag or cold compress to the head.

Convalescence is hastened by tonic hydriatic measures—the dripping sheet, electric light bath, followed by the horizontal rain bath, jet douches or half bath, the method of using being in the order named.

Cerebro-Spinal Meningitis.

Epidemic cerebro-spinal meningitis is a malignant fever, characterized by headache, vomiting, painful contractions of the muscles of the back of the neck, delirium, coma, and frequently an eruption of purpuric spots. Its origin is microbic, being due to the Weichselbaum-Jäger diplococcus intracellularis, or to a mixed infection; the pneumococcus is believed to be the cause in many instances. Bad hygiene, exposure, and sleeping near the ground are supposed causes. It is slightly contagious, its method of transmission being unknown, but supposed to be through the cribriform plate of the ethmoid bone. The complications and sequelæ are numerous. The mortality varies in different epidemics from 20 to 75 per cent. Isolation is best, though not absolutely necessary. All discharges and excreta must be disinfected. Liquid, supportive diet, milk, soups, eggs, albumen-water, etc. For intense pain, morphia hypodermically; coal tars and depressants must be avoided. In 1894 Aufrecht, of Magdeburg, introduced hot baths, and this has become a recognized method since then. The full hot bath, commencing at a temperature of 95° to 100° F. and rapidly increasing to a temperature tolerated by the patient, for fifteen to thirty minutes, followed by the warm or hot full dry pack, repeated three times daily, or, if necessary, every three hours, is unquestionably the best method. During and between the baths the ice-cap, cold cephalic compress or cold coil must be kept upon the head. The use of the long Chapman's spinal ice bag oftentimes aids.

The influence of the bath is to act as a sedative to the nervous system, to relax and prevent muscular spasm, relieve pain, hyperæsthesia, restlessness and to prevent sequelæ. The skin should be kept constantly warm between baths in order to draw the blood from the brain and spinal cord.

Goldscheider advises active movements while the patient is sub-

merged in a bath of ordinary temperature. Cardiac collapse may be combated by the ice-bag to the precordia. Regansky,* after five years' experience with Aufrecht's method (fifty-one patients) in the women's wards, giving the bath for fifteen to twenty minutes two or three times daily, says that the bath to be efficient and curative must be commenced before the fourth day, although its influence for good is pronounced even after this long a time has elapsed. A most remarkable result was noticed on sub-delirious patients, one bath frequently clearing them up. He gives the following interesting table:

	Number Treated.	Deaths.
First day	1	0
Second day	1	0
Third day	2	0
Fourth day	6	1
Fifth day	10	6
Sixth day	7	2
Seventh to twelfth day	15	5
Sixteenth to thirtieth day	9	3

In the men's wards, of fifty cases in the same epidemic, practically control-cases, and treated by the "ordinary and usual methods," forty died, a death-rate of 80 per cent.; death-rate of all cases by Aufrecht method, 35 per cent. Varochilsky reports two recoveries and Vallich five cures out of seven cases. It will be noted, however, that where the bath method was instituted *during the first four days* the death-rate was only *10 per cent.* The sequelæ are comparatively few.

Of late repeated lumbar puncture, with drainage of the pus, has been helpful, and in several cases seemed to save life, even though the diplococcus was present. The pus should be drawn off slowly to prevent too rapid a fall of pressure.

Convalescence is tedious, and the sequelæ must be met as outlined under other heads. As the patient improves, general tonic and roborant hydriatic measures must be used, of which the dripping sheet, the full wet pack, the electric light bath, followed by the half bath, horizontal rain and jet douche, are to be mentioned.

Smallpox.

Variola is an acute, epidemic, contagious disease, characterized by fever, severe lumbar pains and vomiting, lasting for three or four days and followed by an eruption, papular, later vesicular, and finally pustular, the pustular changes being accompanied by secondary fever and a tendency to the development of grave complications. Its origin is unknown, probably microbic, possessing a virulent vitality for long periods. One attack renders immunity. Jenner's great discovery of the protective value of vaccination has been fully proven,

* Regansky, M.: Medicinskoje Obosrenije, 1894.

and is only rejected by rabid sentimentalists, who know not whereof they speak. Epoch-making, it has demonstrated that the ounce of prevention is better than the pound of cure, for just in proportion to the efficiency and thoroughness of vaccination is the rarity and mildness of variola. Its mortality ranges from 4 in the discrete, 50 in the confluent to 100 per cent. in the malignant. In unvaccinated persons 20 to 60 per cent. die. Smallpox comes under State control at present, and health boards remove cases at once to "pest-houses," disinfecting the premises where the case originated, a law just alike to the sick and those who must be protected.

By removal we secure complete isolation, a *sine qua non*. The room should be bare of furniture and kept scrupulously clean, the clothes, bed-clothing, utensils, dejecta, dishes, and all objects used conscientiously sterilized. The patient is confined to bed in a darkened room, which should be well ventilated and kept at a temperature of about 65° F. The diet should consist of liquids—milk, whey, broths, eggs, and similar food. The white of eggs, to which orange juice has been added, then strained, forms an excellent food. If unvaccinated, this should be performed at once, in the attempt to modify the attack. The nose and throat must be regularly sprayed with Dobell's solution, and the eyes irrigated with an alkaline boric acid solution. This should be done *prior to feeding*. The general treatment should aim at keeping the temperature down and favoring skin activity, this being best accomplished by the full bath. As far back as 1862 Hebra, of Vienna, presented his "hammock" continuous bath for the treatment of variola and other conditions requiring prolonged immersion. Of its use Stokes (1872) says: "It is clear that in the case of the continuous bath we have all the conditions completely filled as regards the person of the patient." Where the continuous bath cannot be employed we may use the full bath at neutral (94° to 96° F.) or warm temperature (98° to 100° F.) for an hour or more at a time, keeping the head cool at the same time by the use of the cold turban frequently changed. These baths will do more to prevent septic infection than any other method known, being at once refreshing, detergent, temperature-reducing, cleansing, antiseptic and pain-relieving. It has been suggested to add permanganate of potash to this bath in weak solution. Between the baths the cold abdominal compress at 60° F., frequently changed. Guinon says that "in the invasion stage, with dyspnea, somnolence and a temperature of 104° F., cold full baths at 64° to 68° F. for adults and 70° to 74° F. for children, should be used systematically, and in sudden emergencies cold affusion. These cold baths do not check, but favor eruption and diuresis. The tepid and warm baths decrease pain and are cleansing." Internally, tincture of the chloride of iron and quinine are the best remedies.

Certain symptoms require consideration. In the case of *delayed eruption* use hot full bath for ten to fifteen minutes, keeping a cold turban on head and sponging the face to prevent discomfort and syncope, followed by full dry pack. For *laryngitis* pellets of ice, antiseptic sprays and the throat compress. Try and prevent by anticipating it with thorough attention to nose and throat. For *nausea* and *vomiting* use pellets of ice, ice-bag over epigastrium, the abdominal compress, the half pack or sinapism to nape of neck. *Constipation* and *diarrhea* are both best met by enemata at 95° F., used daily in the case of constipation, and irrigating the bowel after each movement in diarrhea. Starch and laudanum enemata are used by some authorities. *Lumbar pain* is most efficiently met by the application of a hot fomentation applied at intervals or by means of the hot half pack for thirty minutes at 110° to 120° F. if possible. For *sleeplessness, delirium*, and other cerebral complications the cold cephalic compress, the cephalic coil or cap and the ice-bag best meet the needs. Mild doses of the bromides may be used, but one must remember that the stomach is very sensitive and irritable. The question of *pitting* is one about which the relatives and friends become much exercised, and the horrible disfigurements that have followed variola justify this anxiety. Finsen, of Sweden, suggested that if we exclude the chemical or actinic rays—blue, violet, ultraviolet—we would avoid the active chemical agent, and by admitting red and infra-red we would have a caloric or heat ray and little chance for chemical action. This was further borne out by the fact that the chemical rays induce inflammation in the healthy skin, and for that reason are all the more likely to possess the power of acting injuriously upon unhealthy skin, and this seems true, as the most numerous and deepest scars are found on the face and hands—that is to say, on parts most exposed to daylight. To overcome this, Finsen suggested red window glass and curtains, but it was not an unqualified success; nevertheless, it should be tried. In addition, the parts should be kept continually moist by compresses wet with a solution of glycerine (2 drachms) in water (1 ounce), the compress being cut to fit like a mask, made of red cloth and covered with oil silk. The hands may be treated in the same manner. Depressing drugs should be avoided.

Convalescence can be hastened by graduated tonic hydrotherapy. When sufficiently advanced the dripping sheet, electric light bath, horizontal rain or jet douche may be used as laid down in this work.

Yellow Fever.

"Yellow jack" is an acute infectious disease, characterized by high fever, yellowness of the surface, and black or coffee-ground vomit. Its origin is a micro-organism, the bacillus icteroides of San-

ecelli, its transmission to man being brought about by the intermediate agency of the mosquito, *stegomyia fasciata*. One attack confers immunity. The disease has been practically controlled in America by the sanitation introduced by the medical corps of the United States army in Cuba during the American occupation of that island. The mortality is high, ranging from 15 to 85 per cent. The patient should be placed in a bare room, closely screened, with free ventilation, and the air kept as near 65° F. as possible. The nurse should be an immune. Water should be drunk copiously; hot lemonade is also valuable. The conditions arise from the presence of the toxins, and every effort must be made to maintain warmth and favor elimination. At the start, for differential diagnosis, quinine should be administered hypodermically. W. Nelson[1] suggests the use of fifteen grains, with two drachms of sodium and water, given every three hours until two or three doses are given. If malaria, the condition clears up; if not, we have to deal with yellow fever. The mixture is as follows:

Quinia sulphat.	dr. ĕ.
Ac. sulphuric dil.	q. s.
Sodii sulph.	oz. ĕ.
Tr. cardamom comp.	oz. ss.
Aquæ q. s. ad	oz. viii.

Fiat solutio. One fourth a dose.

Nelson says:

"The rest of the procedure was likewise born of experience; it was as follows: The patient was first prepared for the vapor bath. It can be given anywhere and in this wise: A chair with a wooden seat is secured. The patient is stripped and seated upon it. His feet are placed in a bucket of hot water, as hot as can be borne without burning. A spirit lamp is lit and placed under the chair. The patient is then covered with blankets, which are carefully tucked in to prevent the escape of heat or moisture. Soon in cases so treated the perspiration would show itself, rolling down the face, arms and body. The patient was wholly enveloped in the blankets, head only outside. In a few minutes the skin lost its angry scarlet hue. The pulse became softer and the headache less. The baths lasted ten or fifteen minutes. They never were pushed to faintness. General improvement followed, to the great relief of the patient and his anxious friends. The patient next was lifted and placed on a bed, there to be enveloped in fresh blankets. Frequently the perspiration kept on for one or two hours. Later, when the skin became again dry, the pulse hard and the face red, the vapor bath was repeated in all its details, twice if necessary. Next in order, as drugs are valueless, I give patients an acid drink, one to be used freely, any of the mineral acids largely diluted. It was a grateful mixture. I let them take a half tumblerful of it hourly or half hourly if the thirst was great. By this simple treatment two great, and, to my mind, most important indications are met—the loaded intestines are emptied and the hot and burning skin is forced to act and eliminate its secretions, the system

[1] Nelson, W.: "Yellow Fever," Twentieth Century Practice of Medicine.

being relieved of the surcharged effete and fecal material. The thirst is incessant; water in abundance, or, better still, acidulated drinks, should be given. The old practice withheld water. The vomiting continued just the same, without it as with it. It is a most valuable flushing agent, to say nothing of the relief afforded to the fever-stricken patient. Symptoms have to be dealt with one by one. In my experience a temperature of 105° F. and upwards in many cases means delirium, sometimes violent delirium. In 1880 I commenced using cold applications in cases of high temperature. A tub was filled with large pieces of ice, towels were placed on them, and soon as they became wet through and cold they are placed on the patient's body, the arms, legs and trunk, to be renewed as soon as they become warm. They abstract heat rapidly, and when the temperature fell to 104° or 104.5° F. delirium and restlessness ceased. Regarding diet, the patients do not want or ask for any form of nourishment. The idea seems wanting. While spirits and champagne have been advised, I fail to recognize their utility. It is needless to state that the management of convalescence requires a special care and constant vigilance. As soon as the patient rallies a little, a ravenous appetite develops. This is a source of great peril, and if the patient or his nurse ignores advice death will result. The diet must be plain, beef or chicken broth, free from fat, a little jelly or custard, a little Vichy or seltzer and milk. Plain water, Vichy or seltzer to allay thirst as soon as it can be tolerated, may be freely given with marked advantage. When admissible the juice of ripe oranges is grateful. These juices have an excellent effect upon a torpid liver. In due time a mild tonic of iron and strychnia is of value. For weeks and weeks the patient's stomach will be in a very sensitive state. In convalescence after severe cases I personally do not think that any meat should be allowed for at least three weeks after the crisis has been turned. As soon as the patient is strong enough a bath of tepid water with a little carbolic acid may be given. At the second bath the nurse may wash the patient's head and body very carefully with soap. Four or five baths of this nature may be given on as many days, their frequency depending upon the patient's condition. A day or two later the patient may be taken into a different room, well away from any draught, when the room, clothing and the effects that have been in the room can be thoroughly disinfected. As far as the mattress is concerned, it should be sprinkled with spirits of turpentine or coal tar, taken into the open and burned. The sending of the patient to a northern climate to complete convalescence is an excellent measure. Away from the hot and enervating tropics, they pull themselves together more rapidly. When fully restored they can return, forever immune."

In addition to the above, the cold sponge may be utilized at such times as the fever rises, or may be regularly used every three or four hours to prevent too great increase of temperature. In case of delirium and cerebral restlessness we can employ the cold cephalic compress, over which is placed the cephalic coil cap, through which cold water is slowly run. Gastric irritation and vomiting are helped by the use of the fomentation for ten or fifteen minutes every two hours, followed by the ice-bag. Cardiac collapse calls for free use

of ice-bag to precordia, alternated with a short application of the fomentation.

Cholera.

Asiatic cholera is an acute, infectious disease, occurring usually in epidemics, characterized by vomiting and purging of a peculiar rice-water-like fluid, severe muscular cramps, prostration, collapse and death or reaction from collapse with subsequent development of a typhoid state. The origin is a micro-organism, the comma bacillus of Koch, which is found in enormous numbers in the discharges. Cholera is little contagious but infectious. It is usually conveyed by drinking-water, due to soil contamination from cholera stools. Flies frequently act as carriers of the contagion. It is claimed that the bacillus is ineffective in the intestinal canal unless persons are the subject of catarrhal states, and it is further known that a healthy stomach will destroy the bacilli. There is no immunity conferred by an attack. Debility, ill-health, intemperance and intestinal catarrh are favorite grounds for their development. In epidemics fright increases the mortality; this fact has been utilized by Eugene Sue in his book, the "Wandering Jew," in the character, "Monsieur Robin." Prophylaxis is the essential in those likely to be subjected to the contaminating influence of the bacillus, and to this end persons should be careful to avoid infection. This is accomplished by the use of none but sterilized, boiled water or milk and the eating of light, easily digested food. All food should be protected from contact with insects. All alcoholic or malt beverages, much meat and unripe fruit must be avoided. The Japanese have used immunizing serum, but it is still imperfect. Cleanliness is a most essential precaution, frequent bathing with warm water and soap, using a flesh-brush, followed by the cold shower, plunge or ablution, is one of the best preventatives. "With pure water, pure air, pure soil, and pure habits, cholera need not be feared." (Hart). Sir Thomas Watson says that people who use cold water daily are frequently exempt. The mortality, as a rule, is high, ranging from 20 to 30 per cent.

Treatment must be instituted early. Isolate the patient in bed and carefully sterilize all the discharges, bed linen, knives, forks, dishes, etc. The nurses should be careful to wear washable garments, covering their hair, shoes, and clothes with over-coverings that can be easily discarded. The hands and arms should be cleansed in antiseptics after each contact. The discharges must be caught in chlorinated lime solution and burned. Calomel at the start, and in the early or diarrheal stage the "Sun" or other well-known mixtures. Hydrotherapy seems to offer the best method of treatment. The entire gastro-intestinal canal demands treatment. To meet this indication we should have the patient at once drink as many glassfuls

of hot water containing each three drops of hydrochloric acid, as much as six or eight being taken. The abdomen should now be kneaded in order to expel the liquid. In addition, enteroclysis should be performed, introducing the soft rubber tube far into the colon and irrigating with two or three gallons of hot soap and water, allowing same to pass out later along the tube. It was Cantani* who first suggested this method. As soon as the canal is well washed out introduce a large quantity of normal saline to make up for loss of liquids by the movements. Hypodermoclysis should be added, employing Cantani's solution—distilled water one quart; chloride of sodium one drachm, carbonate of sodium forty-five grains; warm to 100.4° to 104° F. and inject one or two quarts into the subcutaneous tissue of the flanks. The results of this method are most striking, sometimes even in the algid stage; if it does not save life it at least gives the patient some relief from his suffering. It elevates the temperature, increases heart action, favors secretion of urine, etc. Dr. Elmer Lee is a champion of the method of enteroclysis, and says:

"The plan, as finally adopted in St. Petersburg, was to take the patient from the ambulance to the bath-room without delay, and when the clothes were removed the patient was laid on his back on the irrigating table, with the knees drawn up and the muscles of the abdomen relaxed; the long tube, after being lubricated with soap, was gently pushed into the rectum and urged by a twisting, gentle pressure into the lower bowel, as high as it could be made to go, and the stream of the previously prepared solution of warm water and soap, making a soapsuds, was allowed to run into the colon. When the colon became filled the pressure exerted would force the water to seek an outlet back through the bowel and out of the opening around the outer surface of tube into a properly constructed receiving-vessel.

"After the bowels had been cleansed the patient was placed in a bath of warm water and afterward conducted to his bed. The irrigation was repeated one or more times. The average number of times that irrigations were given in St. Petersburg was twice; occasionally a third irrigation was given, but frequently one irrigation was found sufficient. There would occur one, three or four evacuations, which would be followed by an interval of rest and cessation of from twelve to twenty-four or thirty-six hours. Relief of the spasm of the intestinal muscles, which produced the intense suffering, followed promptly upon the removal of the irritating contents, and the administration of morphine was not required. In nearly every case the stomach was also irrigated with a solution of salt and water. After this combined treatment vomiting and purging in most cases would subside. As an internal treatment I recommended and used hydrogen dioxide diluted with distilled water, given in cupful doses at intervals of three hours, with the object of further cleansing and disinfecting the intestinal canal.

"The irrigating-apparatus consists of a low table suitably made, as represented in the accompanying illustration. Such an apparatus

* Cantani, B.: Berliner Klinische Wochenschrift, No. 37, 1892.

should be provided near the homes of the poorer classes, as well as in every part of the city, and a physician should be detailed to receive and treat every person with symptoms of looseness of the bowels or abdominal colic. Then, if thought desirable, the patient should be transferred to a hospital or permitted to return home."

The generally accepted method of external hydriatic treatment is that of William Winternitz and employed in German hospitals. The patient was enveloped standing in a cold dripping sheet and rubbed down until the surface of the body became warm. After three to five minutes' rubbing he was wrapped up in a blanket and put into a sitz bath at a temperature from 44° to 59° F., where he remained fifteen to thirty minutes, the abdomen being rubbed energetically by the attendants, and his extremities and such parts of his body not in the water protected by flannels. He was now put to bed with a compress wrung out of water at a temperature of 50° F. applied to the abdomen. By this time the patient began to perspire and feel comfortable. If diarrhea appeared within four to six hours the same treatment was repeated, which was rarely needed. When objections were abundant the application was limited to rubbing with the cold dripping sheet well wet and the use of abdominal compresses, with an early resort to subcutaneous saline infusions. Inject a syringeful every minute till the pulse returns, then once in five minutes, and later once every half-hour. And not till the urine is secreted in considerable quantity should this procedure be stopped.

"Clinical as well as post-mortem observations have taught us that the shock in the pre-algid stage is due to the rapidity of transudation rather than its quantity. Whatever may be its cause, the object of our treatment must be to strengthen the action of the heart and accelerate the circulation of the blood, which has become stagnant. For this purpose no procedure is more effective than such a thermic and mechanical irritation of the skin as is produced by the above-outlined treatment; and the greater the collapse the more urgent the indications for its employment." (Winternitz.)

When cramps, a most disagreeable and distressing condition, arise they can be best met by rubbing the affected areas with a smooth piece of ice, the excruciating pain being relieved rapidly. Where choleraic anuria exists it is best combated by the use of hot drinks or the hot full bath, hypodermoclysis and hot saline injections. In the extreme algid stage the patient's entire body may be rubbed with smooth pieces of ice until the skin becomes warm, after which he should be removed to hot blankets. Keep warm and repeat the procedure as often as indicated.

Cholera Nostras.

Cholera morbus or cholera nostras so closely resembles Asiatic cholera in its clinical aspects as to deserve consideration at this point.

There is great difficulty in differentiating the diseases; many authors believe they are identical. While the micro-organism closely resembles the comma bacillus of Koch morphologically, it nevertheless liquefies gelatin and does not give the cholera-red reaction. The disease is considered to be an acute catarrhal inflammation of the mucous membrane of the intestinal tract, characterized by severe pains in the abdomen, incessant vomiting, purging, cold surface, muscular contractions, weak pulse and great prostration. The stools become rice-water-like in character, though in some cases they remain bilious and serous. The disease is usually seasonal, especially present in summer and early autumn. The mortality is about 5 per cent., some cases lasting only one or two days, some one or two weeks. The treatment is essentially that of Asiatic cholera. Prophylactic measures, especially in diet and hygiene, are important.

Typhus Fever.

Spotted fever is an acute, infectious, febrile, epidemic disease, highly contagious, characterized by sudden onset, intense depression of the vital powers and peculiar maculated and petechial eruption and sickening odor. Its origin is supposed to be an infecting micro-organism, which at the present time is unknown, and which is influenced by filth. The United States is free from the disease, which is rarely seen except in its sea-ports, among emigrant population. The prognosis is variable, the mortality running from 10 to 35 per cent. The contagious nature of the disease renders it imperative that the patient be isolated in a room devoid of carpets, hangings, etc.; in fact, treatment in the open air is the best. If possible a nurse should be secured that is immune. The patient should be placed in a single bed accessible at either side and the clothing and bed linen frequently changed, care being taken to carefully sterilize all articles. The dejecta must be caught in antiseptic solutions and burned, the nurse at the same time taking care to protect herself by wearing washable clothing and sterilizing her hands and arms after each contact. The mouth should be kept clean and antiseptic, the teeth being washed several times daily with a brush. Dobell's solution is to be frequently sprayed into the nose and throat. The hydriatic management of this disease resembles in many respects that of typhoid fever, with the exception that the measures adopted should be less refrigerant. To this end the use of the cold sponge is a very valuable measure, as is the full cold bath at a temperature ranging from 90° to 80° F. Friction should be maintained during this bath, and the patient's head carefully protected by means of the cold turban or ice-cap during its application. The prolonged neutral bath once or twice daily has been suggested in this disease. The cold full pack, repeated

every three hours, may be used in place of the full cold bath. This bath has one decided advantage in that it tends to prevent the nervous complications so often present in this disease; in fact, insomnia, cerebral congestion, headache and delirium are best met by the combination of the prolonged neutral bath, with application of the cold cephalic compress with the cooling coil-cap. Outside of the hydriatic measures and general hygienic management of the case little else need be done. The effect of the bath is to promote the action of the skin, abstract heat, stimulate the liver and destroy toxins, increase diuresis, lessen cellular disintegration, favor antisepsis, calm and tone the heart and nervous system and increase phagocytic action.

Montana Spotted Fever.

In 1902 Wilson and Chowing and later Ashburn,[9] called attention to this febrile disease, which had been noted by local observers in the Bitter Root Valley, Montana; the Snake River Valley in Idaho, Quinn River in Nevada and certain parts of Wyoming. These observers found that it was parasitic in origin and transmitted by insects. In its clinical aspects this fever partakes of certain features of typhus fever, and at times epidemic cerebro-spinal meningitis. It, however, is not contagious, and the nerve symptoms are much lighter than those of the last-named disease. It is seasonal, occurring almost exclusively in the spring and early summer, following an incubation period of three to ten days. The onset may be by chill or chilly sensation, headache, bone and muscle pains and nausea, to which later may be added nose-bleed and slight bronchitis. The fever gradually rises, with evening exacerbations, and reaches its maximum from the eighth to the twelfth day, when the evening temperature may register 105° or even 107° F. It remains high in fatal cases, and in favorable ones falls by lysis. The eruption is characteristic, appears in most cases about the third day, *first* on the wrists, arms and legs, later on the forehead, back and chest, and *last* on the abdomen. The eruption commences as bright red macules, changing to a purplish hue, and finally becoming definite petechiæ. The pathological changes in the internal organs are those parenchymatous conditions usually found in febrile states.

Ashburn[10] has found in this disease that the Brand treatment of typhoid fever, together with occasional infusions of normal salt solution, is the best method. Each patient presenting a temperature of 102.5° F. is placed in the full bath at 70° F. for ten to twenty minutes, constant friction being applied to the body and limbs, and simultaneous cold applications are made to the head. The bath should be followed by feeding, quiet, rest in bed, and, if necessary, hot-water

9 Journal American Medical Association, May 27, 1905, p. 1685.
10 The Lancet-Clinic, Vol. XIV, No. 17.

bottles to the feet. Ashburn calls attention to the fact that *all the precautions required in the administration of the full bath in typhoid fever must be followed in treating these cases*, especial care being exercised to constantly use friction. He finds that it is most effective upon the circulation, and through this channel secondarily influences the skin, kidneys, lungs, nervous system and temperature. The baths should be give at fairly regular internals. Success has resulted from this treatment.

CHAPTER XII.

DISEASES OF THE STOMACH AND INTESTINAL TRACT.

Acute Gastritis.

Acute gastritis is an acute catarrhal inflammation of the mucous membrane of the stomach. It originates most frequently from indigestible food, alcoholic beverages, infectious fevers, irritating medicines and corrosive poisons. The prognosis is variable, depending upon the cause; it is frequently followed by the chronic form. In its treatment the first essential is rest; to secure this rest the patient must be put to bed and all food withheld, if necessary, for several days. Small pieces of cracked or shaved ice may be given. Unless absolutely necessary, do not administer morphine. With an improvement of the condition, we may commence with clam broth, fresh milk, Eskay's food, meat juices, and in a few days light diet, gradually increased to the normal. Hydrotherapy is the most satisfactory of all treatments. The best method is that of the hot fomentation, applied fifteen to twenty minutes over the stomach and bowels, followed by the abdominal compress at 60°; repeat every two or three hours; this will frequently give immediate relief. To this may be added the hot foot-bath at 110° to 115° F. for fifteen minutes. Another method is to use the hot foot-bath followed by the hot half pack for one hour; it is also an excellent method. I have seen undoubted benefit from the internal administration of hot water. Winternitz has had much success with the use of the cold compress frequently repeated. Where the nausea does not yield to this treatment, we may apply the hot fomentation to the epigastrium, followed by the ice-bag over the stomach or to the spine opposite. In two of my cases magical relief has been given by careful lavage with very hot water. The pain is best relieved by the hot fomentation and compress frequently repeated, in conjunction with hot water or lavage. In infants or young children the use of one-sixth of a grain of calomel placed upon the tongue dry, repeated until six doses are given, will frequently aid in recovery.

Chronic Gastritis.

Chronic gastritis is a chronic catarrhal inflammation of the stomach, with thickening of its coats and some atrophy of the glandular structures. It originates frequently from previous attacks or from the use of alcoholic liquors and cold beers. Unsuitable, irritating

and improperly cooked food, poorly masticated and insalivated, together with irregularity in meals and overeating, has been in my experience, the most frequent cause. Many infectious diseases, diseases of other organs, and the overuse of tobacco may be noted. The prognosis is good in those cases that have not reached the atrophic stage; even these can be ameliorated. Prevention is better than cure. These cases should avoid fatty, saccharine, starchy and highly seasoned food, under which head would come mustard, pepper, vinegar, strong acids, preserves, cheese, alcoholic beverages, tea, coffee, coarse vegetables, pickles and confectionery. The diet should be plain and consist of lean tender meats, finely divided, beef, mutton, sweetbread, chicken and squab, calf's foot and pig's head jelly, eggs, milk (if borne), purées of vegetables, rice, cereals (well cooked), spinach, celery, mashed French peas, apples, boiled, baked and mashed potatoes, cream, butter, toast, zwieback. Plain water, milk, and cereal coffees may be used. All food must be well chewed before swallowing. Mental and physical rest, freedom from business and work are advantageous. The clothing should be such as will protect the abdomen from being chilled. Rest should be taken before and after a meal.

Hydrotherapy is one of the most satisfactory factors in the treatment of this disease. Lavage in the morning, half an hour before breakfast, the water containing bicarbonate of soda. If the stomach is mirritated, cool or cold water may be employed; if irritated, hot water. The intragastric douche of hot water, followed by cold, has proved very satisfactory in my hands. Where lavage cannot be practiced, hot water, half to one pint, sipped an hour before meals. The temperature should range between 110° and 150° F., a pint to contain five grains each of calcium chloride and sodium chloride. Commence with mild measures, such as the hot-air bath or the electric light bath, until the patient just perspires. Follow this by the wet sheet at 70° F. for three minutes, with vigorous friction, reduced three degrees daily until 60° F. is reached. At this point continue the electric light bath until the patient perspires, following same by the horizontal rain or circular douche at 102° to 104° F. for one to one and a half minutes, followed by the fan douche to the body and the jet douche to the spine and legs for one-fourth minute each, under fifteen pounds pressure, commencing at a temperature of 70° F., reducing two degrees daily until 60° is reached, and increasing the pressure until thirty pounds is registered. This latter has in my hands proved by far the most certain and satisfactory means of treatment for these cases. Where we have to deal with much pain, the Scottish fan douche to the abdomen, gradually raising the temperature of the hot water, lowering the temperature of the cold and increasing the pressure, will oftentimes give satisfactory relief. Com-

mence the douche at a temperature of 100° F. for one-half minute, reduced to 70° F. for ten seconds, alternating four times; gradually increase the hot water to 108° or 110° F. and reduce the cold water to 60° F.

Where there is much vomiting of mucus in the morning, one may employ the abdominal compress or Neptune's girdle during the night. Where the vomiting takes place immediately after eating, rest in bed with an abdominal compress worn for two hours, or Chapman's ice-bag over the dorsal region of the spine, should be utilized. Winternitz has found the use of the cold compress and cold *sitz* bath very beneficial in these cases, but the writer's experience has been that the above-suggested treatment does better. For the constipation that so frequently accompanies the disease, enemata and the Scottish douche as above described applied to the abdomen, will aid in its relief.

It is my custom in these cases to also use general massage for its tonic, nutritional and circulatory advantages. In those cases in which atonic states exist, local massage of the abdomen two hours after a meal is indicated. Exercise always helps. Rowing, pulley-weight movements and general gymnastics, having for their object the exercise and movement of the trunk muscles, tend to develop a much-needed muscular condition of the abdomen, lacking in these cases. In like manner gastro-intestinal and abdominal muscular development may be rapidly brought about by the use of the faradic current externally and the slowly alternating sinusoidal current, one pole in the rectum, the other applied to the abdominal muscles. Intragastric faradization acts in the same manner, developing both stomach and intestinal muscle power.

Gastric Atony; Dilatation; Intestinal Atony.

By gastric atony is meant that condition of the stomach (or stomach and intestine) characterized by a weak, flabby condition of the muscular apparatus, the result of which is to retain the food too long within its walls. Various secretory and chemical disturbances of the gastric (or intestinal) juices may accompany the condition. It is closely allied to dilatation, and may be the primary stage, the difference being that in dilatation stretching has actually taken place—that is to say, non-obstructive dilatation. Atony and dilatation bear a close relation to the muscular power of the intestinal abdominal wall. This is necessary to bear in mind, for some cases are unquestionably due to this factor alone. The origin of these conditions lies in those unhygienic conditions, the result of modern strenuous, high-pressure life, causing meals to be eaten too hastily, accompanied by over-eating, deficient mastication, excesses in vino, in venery, in work, neurasthenia, or any condition that lowers vitality. In addition, in

women, the corset, tight waist-bands, heavy skirts and the inexorable dictates of fashion increase the number of victims. The diet should consist of milk, cream, butter, eggs, toast, partly dextrinized products like shredded wheat biscuit, "Force," grape nuts, etc., purées of vegetables, plasmon, beef-juice, finely minced lean meats, rice, corn meal, hominy, ripe seedless fruits and one glass of liquid with each meal.

Hydrotherapy is of the greatest benefit to these people; in fact, there is no treatment which compares with it. The cold tonic procedures that should be used to invigorate, increase appetite, stimulate the muscular fiber of the stomach, intestine and abdominal wall, and exert an influence upon the nervous system, are incomparably superior to any other treatment. Lavage may be indicated, but the intragastric douche of hot and then cold water—that is to say, a Scottish douche—internally to the mucous membrane of the stomach three times weekly, on arising, will develop contractile power to no small extent. Where the patients are weak and greatly debilitated, we may commence the general treatment by the full dry pack for one hour, followed by the cold sponge. The dry hot pack may be followed with the salt rub if preferred, care being taken not to apply too vigorous friction, it in its turn being followed by a very rapid cold sponge. Another valuable method of treatment is to administer the dripping sheet at 70° for three minutes, with vigorous friction, reducing two degrees daily until 60° F. is reached, followed by the cold sitz bath at 70° for three to ten minutes. As soon as able, the hot-air bath, or, what is preferable, the incandescent electric light bath, to the point of perspiration, followed by the dripping sheet at 70° for three minutes, reducing two degrees daily until 60° F. is reached. As soon as this has developed the reactive power of the patient, we may continue the electric light bath until perspiration takes place, then the circular or horizontal rain bath at 102° to 104° F. for one and one-half minutes, followed by the fan douche to the body and the jet douche to the spine and legs. Commence the douches at a temperature of 70° F. and reduce one degree daily until 60° F. is reached. The pressure should start at fifteen or twenty pounds and gradually be increased to thirty as the temperature is lowered.

If epigastric pain or gaseous distension of the abdomen is present, the Scottish fan douche will prove most effective in its relief, as well as assist in overcoming constipation. Use as follows: Electric light bath to perspiration; fan douche at 104° to body; Scottish fan douche, 104° to 110° F., for twenty seconds to abdominal walls, changed to 60° F. for five to ten seconds, alternating four times; finish with jet douche to spine and back of legs at 60° F. for five to ten seconds.

By the combined use of the methods herein suggested I have seen these miserable humans rejuvenate, take courage again and regain

strength, their depression leave, and life's way become once more lighted by the sunshine of hope.

Splanchnoptosis.

Splanchnoptosis, or Glénard's disease, is a generic term indicating a downward displacement of one or more of the abdominal viscera. It includes gastroptosis, enteroptosis, nephroptosis, etc.; it may be one or all; they are often coexistent. Its origin is most frequently to be found in a weakening of the abdominal muscles, a loss of abdominal tone, with a co-operating mechanical cause that increases the disability, especially corsets and heavy skirts. Trauma is a frequent cause. In this, as in many other diseases, the vital unit has a great influence upon its inception. Unhygienic and muscular-weakening influences, the result of the present-day strenuous methods of life, with its ever-present neurasthenoid and debilitating influences, has much to do with bringing about the condition. Its cure is brought about by an increased strengthening of the general neuro-muscular system and a special developing of the abdominal muscle, together with deposition of fat. Support to the prolapsed viscera is necessary, and to this end a well-fitting abdominal belt or supporter should be adjusted. It has been the writer's experience that while patients are taking hydrotherapeutic and mechanical treatment it is best to wear the belt, although in some instances he has seen much greater good derived from Rose's method of support by means of adhesive plaster. The diet should depend on the functional and motor power of the stomach and the condition of the intestine. Plain nutritious food, tender meats, fish, game, eggs, well-cooked cereals, purées of vegetables, moderate use of sweets, fruits, milk and cereal coffees, should be allowed. With the regulation of hygiene we may commence the use of the hot-air bath, or, what is better, the electric light bath, to the point of perspiration, followed by the dripping sheet, with friction for three minutes, commencing at a temperature of 70° F. and reducing two degrees daily until 60° F. is reached. At this point we may change to more active treatment; continue the electric light bath until perspiration takes place, followed by the circular or horizontal rain bath at 102° to 104° F. for one minute, pressure twenty pounds, reducing the temperature two degrees daily until 60° has been reached and gradually raising the pressure one pound daily until thirty pounds is recorded. We may now safely move to the strongest treatment—electric light bath until perspiration takes place, this to be followed by the circular rain bath at 104° F. for one and one-half minutes. Finish the treatment by giving the fan douche to the entire body, especially the abdomen, and jet douche to the spine at a temperature of 70°, pressure fifteen pounds. Lower the temperature one degree daily until 60° F. is reached and increase pressure two pounds daily

until twenty or thirty pounds is recorded. Some writers, notably Kellogg, prefer to finish the treatment with the cold plantar douche, believing that this materially assists.

In those cases that are very weak and much run down the institution of a rest-cure and fattening should be adopted, for which see "Neurasthenia and Hysteria."

Electricity is of unquestioned value, the author having found the high-tension faradic applied to the spine and muscles of the abdomen especially valuable. The sinusoidal current, slowly alternated, one pole in the rectum, the other applied upon the abdomen, in sufficient strength to produce muscular contractions, tones up those structures that are especially deficient. In these cases abdominal massage holds a prominent place. It should be administered daily with general massage, or may be given immediately after the hydrotherapeutic treatment. Special exercises which have for their object the contraction and movement of the central and lateral abdominal and trunk muscles, will prove of valuable assistance. Upon recovery, where it is deemed necessary to certainly keep the viscera in place, Rose's bandage may be applied. Care in sitting and walking should be exercised by these patients, a proper upright position being at all times assumed. Where this treatment is followed out persistently most excellent results will be obtained and surgical interference may be unnecessary.

States of Hypersecretion—Hyperchlorhydria; Reichmann's Disease; Chronic Sthenic Gastritis; Gastro-Succorrhea; Hyperchylia.

Under this head we will consider those states in which the hydrochloric acid or the gastric juice itself is increased. The background of these troubles has, in my observation, always been that of a perturbed nervous system, and I am of the opinion that the increased secretion of hydrochloric acid is largely the result of the nervous condition. This should be most diligently sought for in each and every case; and, as far as possible, worries, overexcitement, business cares and the strains of life eliminated. The diet must not contain irritating food, such as condiments, salt, pepper, sauces, vinegars, etc.; albuminoids should be restricted, and milk, eggs, well-cooked cereals, toast, zwieback, butter, moderate amount of fats, vegetables as purées; potatoes, baked, boiled or mashed, with butter, cream and milk, macaroni, spaghetti, spinach, baked sweet apples, ripe peaches, pears, oranges, bananas and white grapes taken. Meats once daily, the lean parts finely divided, hamburger steak without seasoning, fish, chicken, turkey, etc. As beverages, water, Vichy, seltzer, Apollinaris and cereal coffees may be used. Plenty of sleep must be secured and moderate fresh-air exercise indulged in. Golf is especially valuable in these conditions, though horseback riding and driving may be utilized.

Hydrotherapeutics are valuable, and alone are sufficient to cure the disease. We can commence by using the hot fomentation an hour before meals in conjunction with the other methods to be hereinafter mentioned. Where recourse cannot be had to institutional treatments, we may employ the hot full bath at 105° F. for ten minutes, followed by a rapid cold sponge, care being taken to keep the head cool during its application. Another satisfactory method, strongly endorsed by European authority, is the use of the cold sitz bath at 60° to 50° F. for five to ten minutes, followed by the stimulating abdominal compress.

Institutional treatment offers the most satisfactory method for these cases. Commence with the hot air bath, or, what is better, the incandescent electric light bath, to the point of perspiration, followed by the use of the dripping sheet, with friction, at a temperature of 70° for three minutes, repeated daily, lowering the temperature two degrees until 60° is reached. At this point we should change the treatment; continue the use of the electric light bath or hot air until free perspiration, followed by the circular or horizontal rain bath at a temperature of 102° to 104° F. for one and one-half minutes; follow this by the fan douche to the body ten to fifteen seconds and jet douche to the lower limbs ten to fifteen seconds, at a temperature of 70° F., pressure twenty pounds. Reduce temperature of douches two degrees daily to 60° F., increasing pressure two pounds until thirty pounds is reached. We may, if we choose, on alternate days substitute the salt rub or glow for the electric light bath, although the writer has found the preceding application much more satisfactory. From some experimental work upon the value of these treatments in states of hypersecretion, the writer feels warranted in stating that these alone are sufficient to bring about a cure, but in conjunction with them certain auxiliary methods will decidedly help.

Intragastric faradization with a high-tension fine-wire coil, as suggested by Reed, has proved of benefit in checking the secretion of gastric juice, applied three times weekly. General massage, avoiding the abdomen, will be found a satisfactory alternate with intragastric faradization. Medicinal treatment is unsatisfactory, although the judicious and careful use of diastatic preparations, especially "Takadiastase," and the alkalies have given relief. The bromides sometimes help.

Gastric Ulcer; Duodenal Ulcer.

Gastric ulcer is a circumscribed solution of continuity involving the mucous membrane and one or more layers of the stomach walls, characterized by pain, hyperchlorhydria, disorders of digestion and vomiting of blood. Gastric ulcer is comparatively rare, but originates most frequently from the corroding action of an excessively strong

gastric juice rich in hydrochloric acid, and occurs especially where the patient is the subject of marked anemia or chlorosis. Some ulcerations occur in the duodenum, especially following extensive superficial burns of the cutaneous surface. The auto-digestion of the mucous membrane occurs when the vitality is low, and where this condition is coupled with hyperchlorhydria one should always suspect gastric ulcer. The powerful tonic, restorative and corrective power of hydrotherapy over these conditions make it the treatment *par excellence*, acting as it does in removing causal factors and relieving present conditions. The treatment should have for its object the complete rest of the stomach, to modify the gastric secretion and restore the vital resistance. Absolute rest in bed for three to six weeks is essential, and for the first two or three weeks rectal feeding three times daily is necessary. This should be preceded by the normal saline solution, and the nutritive enema may consist of milk four ounces, two eggs well beaten up, a pinch of salt, all predigested by pancreatin. Reed suggests the use of milk, freshly expressed meat juice, meat powders, beef juice, raw eggs, solution of sugar, butter or olive oil, and well cooked solutions of starch. Ewald's plan is to use two or three eggs beaten up with a tablespoonful of cold water; a tablespoonful of prepared cereal, dextrinized by heat, is boiled with half a tumbler of a 20 per cent. solution of grape sugar, and a wineglassful of claret added. When lukewarm, stir in the eggs and add fifteen grains of salt. Return to feeding may begin with milk and lime water, equal parts; milk, lime water, barley water, equal parts; then, as judgment suggests, soft-boiled or poached egg, calf's-foot jelly, purées of vegetables strained, so that by the end of six weeks well-cooked cereals, "Force," grape nuts, cream of wheat, stale bread, butter, etc., are in the dietary. For months the patient must avoid alcohol, beers, wines, tobacco, condiments, acids, vinegars, excess of salt, hard food and coarse vegetables. The hydrotherapeutic treatment of this trouble should consist of measures that relieve the pain, lessen the formation of hydrochloric acid and diminish gastric activity. This is best accomplished by the use of the hot fomentation for fifteen to twenty minutes, followed by the hot abdominal compress, well covered with flannel, over which may be placed oil silk. The flannel must be wrapped around the body in such a way as to prevent the loss of heat.

Sadger[1] believes in powerful stimulating general and local measures. He finds that the abdominal pack at 60° F., changed every four hours, in conjunction with a coil inserted in the pack once or twice a day, and through which water at 104° F. (40° C.) is allowed to flow, an excellent measure. As soon as possible he adds to this a sitz bath at 46° to 55° F. for three to five minutes once daily. In the morning a

1 Berliner klinische Wochenschrift, April 14, 1900.

rapid *cold* sponge is given, avoiding chest and abdomen. A good arrangement for home use is a cold pack until the sheet gets warm (twenty to thirty minutes), with a half bath afterward at 22° or 20° C. (68° F.) for two or three minutes. Milk is the only food he allows for four or five weeks, commencing with a teaspoonful every fifteen minutes. He increases the amount to a tablespoonful, then to half an after-dinner coffeecupful, and finally to a teacupful, lengthening the intervals to thirty to sixty minutes. He insists on this diet after acute hemorrhage, and also in the treatment of chronic ulcer. Even on the day of the hemorrhage it is possible to commence with minimal amounts of the milk (ice cold). The milk must always be very slowly sipped.

By these methods much good may be accomplished in conjunction with the dietetic, hygienic and medicinal treatment of the disease. In hemorrhage no ice or cold drinks must be taken into the stomach, as they will actually favor hemorrhage when the water accumulates and becomes warm. A cold compress should be placed over the stomach, and upon this the cold coil or ice-bag (not too heavy) may be laid, keeping same up for a week.

States of Hyposecretion — Hypochlorhydria; Achlorhydria; Anacidity; Hypochylia; Achylia Gastrica; Hypopepsia; Apepsia.

Under this head we embrace those conditions marked by the diminution or absence of hydrochloric acid in the gastric juice. It must be borne in mind that there are numbers of instances in which the diminution or absence of the hydrochloric content is not due to the conditions we are here discussing, being brought about by such diseases as asthenic gastritis, amyloid degeneration, atrophy, carcinoma, etc. It is not intended to otherwise than convey the idea of a condition of suppression or absence, generally of a nervous or neurotic origin, and not dependent upon organic structural lesions, consequent upon or sequential to other disease. The writer has seen quite a number of achlor- and hypochlorhydric cases, although they form a small class in his experience compared to the hyperchlorhydric group. They are usually constructed upon a neurotic, neurasthenic or devitalized basis. Hygienic errors, absence of fresh air, mental worry and strain, loss of sleep, digestive errors and indiscretion, all lead to its production. In passing, we may say that the treatment, to be successful, must be continued over a lengthy period. The patient should avoid all rich foods, gravies, much meats, pickles, cane sugars and confections. Every effort should be made to preserve and stimulate the secretion of hydrochloric acid. Hydrotherapy alone is sufficient to bring this about, its value having been fully determined by me in a number of cases carefully studied with this in view. Where there is any tendency to weak muscular power and stagnation of the gastric

contents we must have recourse to lavage. After cleansing the stomach, several washes should be made with hot water, followed by cold water, thus subjecting the mucous membrane of the stomach to the influence of the Scottish douche. To stimulate appetite and the flow of gastric juice, drink half a glass of cold water one hour before meals and put an ice-bag over the stomach for an hour before eating. General hydrotherapeutic methods are most valuable, as they tone up the relaxed musculature, increase secretions generally, and improve nerve force. Commence with the electric light bath or hot-air bath until perspiration. This may be followed by the dripping sheet with friction at a temperature of 70° F. for three minutes, lowered two degrees daily until 60° F. is reached. Reaction must be secured. As soon as established we should commence with the electric light bath or hot air until perspiration, followed by the salt rub with sufficient friction to redden the skin, followed by the horizontal or circular rain bath at 104° F. for one and one-half minutes, reduced to 80° F., under twenty pounds pressure; reduce two to three degrees daily until 60° F. is reached and raise the pressure two pounds daily to thirty pounds. When this point is reached we may now follow the rain bath by the fan douche applied to the body for five to ten seconds, and the jet douche to the spine for five to ten seconds, at a temperature of 60° F., thirty pounds pressure. Especial pains should be taken to have the jet strong in the dorsal region opposite the stomach. As soon as the improvement is marked the following hydriatic treatment should succeed the others: The daily use of the electric light bath or hot-air bath to perspiration; horizontal rain bath at 104° F. for one and one-half minutes; the fan douche to the entire body for one-fourth minute; the jet douche to the spine one-third minute and to the abdominal wall for one-fourth minute, at a temperature of 60° F., under a pressure of twenty or twenty-five pounds. It is sometimes marvelous to contemplate the changes that will take place under the powerful, stimulating and perturbating influence of this treatment. Cases that were apparently hopeless take on new life and vigor, and respond to the treatment with a reaction to which they had been strangers for many years.

Auxiliary treatment I have found of considerable value, especially central galvanization, the large negative pad being applied over the abdominal sympathetic, the positive over the cervical. The static wave current (Snow), using a large block-tin pad applied over the abdomen, is a valuable treatment. Manual massage and mechanical vibration in connection with the slowly alternated sinusoidal current will aid hydrotherapy in rapidly toning up the local structures of the abdominal wall of stomach and intestines, increasing secretion, favoring elimination and overcoming constipation.

These cases should be urged, where it is possible, to indulge in

swimming after they have been relieved of the disease. Surf bathing offers probably the best post-treatment we have, combining as it does fresh air, exercise and the stimulating percussory influence of the saline water upon the skin. The duration of an immersion in the surf should be brief, followed by a rub down and short walk.

Acute Intestinal Catarrh; Acute Enteritis; Acute Entero-Colitis; Acute Gastro-Entero-Colitis of Children; Cholera Infantum; Summer Diarrhea; Summer Complaint; Acute Diarrhea.

The above states are due to acute inflammations of the mucous membrane lining the intestinal tube, characterized by pain, tenderness and looseness of the bowels; in some fever is present. There is no question but that in a great many cases the disease is due to the presence of micro-organisms, which have been ingested and multiplied in the intestinal canal. In others, ptomaines, offensive and irritating food and exposure are the determining factors. In all, the first element should be the prompt removal of the offending mass; if the case is vomiting, wash out the stomach with hot water, followed by the ice-bag to the external surface. The copious drinking of hot water is indicated; this should be administered in teaspoonful doses and in small children by nursing bottle. All food must be withdrawn. Where calomel is indicated this may be administered as a dry powder upon the tongue in one-sixth to one-fourth grain doses, repeated every thirty minutes until a grain or two have been taken. The bowels should be immediately and thoroughly emptied by means of a hot saline enema, temperature 105° to 110° F., and repeated at least twice daily as needed. By this means the calomel will cleanse the small intestine, and the enema, by irrigating the colon, removes the mucus, bacteria, fermenting material and food. The absolute abstention from food neutralizes the efficiency of germ life, removes its nutrient medium and reduces intestinal activity to a minimum. In the cases occurring in children, the hot full pack, until hyperemia of the skin takes place, followed by the cold sponge rapidly performed, is indicated. If fever is high, use the wet pack at 70° F., reduced each time two degrees until 60° F. is reached, at which temperature it is to be maintained. It should be repeated every three hours if necessary, its repetition being regulated by the general condition and fever. In adults the cold sitz bath (70° to 50° F.), ten to thirty minutes' duration, is a valuable method, and the author can speak in unmeasured terms in its praise, it having in his hands yielded some brilliant results. Its action is to lessen peristalsis and produce an anemia of the mucous membrane. In a member of his own family this measure has accomplished, in acute exacerbations and chronic states, results most prompt and satisfactory. There are cases in which appear nervous collapse, prostration and inanition, and in whom shock is well marked, due to

the diarrhea and absorption of ptomaines; in these cases the nervous system is profoundly involved, showing apathy, pallor and cold extremities. They present many of the symptoms of the so-called "typhoidal state." The indication is the full bath at 90° F. for seven to ten minutes, repeated two or three times daily. Do not be swerved from the procedure by any cry or protest; be kind, but firm. The friction should be gentle, the patient removed to the sheet, covered and packed with blankets. The remarks made covering typhoid fever bear on these cases with this distinction and difference, that in intestinal troubles a more decided reaction must be sought.

"The object of this bath is not alone to reduce temperature, although this is an important incidental result. We have here a vasomotor paralysis, as evidenced by the pallor of the entire body, even when a high temperature is registered in the rectum. By immersing the entire body in tepid water we produce a mild cutaneous excitation, which is gradually increased by the removal of warmth and the addition of cold water, and is enhanced by frictions of the body and constant agitation of the cooling water against the skin. These gentle shocks are not beyond the child's reactive capacity; they are succeeded by equally gentle reactions, so that the cutaneous vessels dilate, as evidenced by redness of the skin. If, in addition, the face and head are bathed with water at 60° F. or below, the shock and reaction are increased, the respiration deepens, and the heart beats with more vigor and less rapidity, the eye brightens, the color returns to the lips, the child becomes more animated." (Baruch.)

The bath may be preceded by a draught of hot water and the dry full pack where fever does not exist. Should collapse supervene at any time, the hot full dry pack, hot-water drinking and the ice-bag to the precordia will be found most useful. The return to food must be along the line of sterile, pasteurized milk, graduated diet, etc.

Acute Dysentery; "Bloody Flux"; Acute Colitis; Acute Proctitis.

This is a group of acute inflammations of the mucous membrane of the large intestine from the ileo-cecal valve to the anus. The inflammation is mostly catarrhal, sometimes ulcerative, and is characterized by fever, pain, tenesmus and bloody stools. It originates most frequently in this country from errors in diet, exposure to cold, wet and general unhygienic conditions. Since the return of our soldiers from the Hispano-American war we have had added the amebic or tropical form, due to the presence of the ameba coli, in the ulcerations of the colon, stools, etc.; of these the author has had a few to deal with. Another form is caused by the bacillus of Shiga, possessing flagella and motility. This bacillary dysentery is now found both in the temperate and tropical climates of our country. Infection occurs usually by means of the generous drinking of water, or food that has come in contact with or been contaminated by discharges. In the treatment of these cases rest in bed is an essential, and overexertion on the pa-

tient's part is best avoided, the bed-pan being used and all discharges sterilized with chlorinate of lime or ferrous sulphate. Liquid, bland diet, such as peptonized or predigested milk, liquid peptonoids, broths, egg-albumen, etc., should be employed. The first measure in the treatment of this disease is irrigation of the entire colon by hot water at a temperature from 105° to 110° F., to remove any offending food, bacteria or irritative material, which will give the bowel a much-needed rest. After this the rectum may be irrigated with cold water (55° to 60° F.), repeated every two hours. It has been suggested to mix this water with alum, creolin and other drugs, and they may be added, although the author has never observed this to be of marked value. In amebic dysentery a 1-2500 solution of quinine, as suggested by Loesch, has proved of value. These irrigations will relieve the inflammation, lessen the distension, diminish the stools, decrease the pain and tenesmus and add materially to the patient's comfort.

Hydrotherapy is of unquestioned value. The plan originally suggested by Winternitz, and ably advocated by Strassel, has given the author very great satisfaction, both in acute and chronic conditions. It is the dripping sheet, commencing with a temperature of 80° F. and reducing two or three degrees daily until 60° F. is reached, followed by the cold sitz bath (75° to 60° F.) for eight to fifteen, even twenty minutes. Kellogg suggests the addition of the hot foot-bath during the administration of the sitz, and there is no objection to this, as it will increase the efficacy of the cold sitz and make the patient much more comfortable; its temperature should be from 105° to 115° F. An important element in the administration of the sitz bath is gentle rubbing to the abdomen during its continuance. The rationale of this is to assist in maintaining tonic dilatation of the surface blood-vessels correlated to the intestines, for its aim is to produce an anemia of the intestine, to lessen secretion and diminish peristalsis. Where it is not possible to administer the above treatment, the hot dry half pack, given for thirty minutes, followed by the abdominal compress at 60° F. for half to one hour, frequently repeated, will oftentimes prove of service. The wet pack, 70° to 60° F. for one or two hours, followed by the half bath, will sometimes overcome the marked asynamia that exists in these cases. Where it is desired to stimulate the general vital and resistive powers, the cold sponge may be employed every three or four hours, as is indicated. The author has found tannalbin of some value in connection with these treatments.

Chronic Enteritis; Chronic Entero-Colitis; Chronic Intestinal Catarrh; Chronic Diarrhea; Chronic Dysentery; Chronic Colitis; Chronic Proctitis.

The above group of chronic inflammatory diseases of the intestines, small and large, are, as a rule, the flotsam and jetsam of acute

attacks; the inflammation, congestion and frequent stools remain, changed some in character, but in general bearing much resemblance to the acute. The pain and suffering are not as marked, although these cases become weak, emaciated, lose vitality and strength, are anemic, dyspeptic, and the subjects of auto-intoxication. Many are markedly neurasthenoid, even melancholic, have tried many men and many things until at last they lose hope, mere existence becoming their lot. I do not hesitate to state that in these cases most brilliant results have been obtained by hydrotherapy, and instead of dreading to deal with these formidable maladies their treatment becomes simple, the result excellent where persistent treatment commensurate with the duration of the disease is persisted in. The diet must always be regulated, be bland and unirritating—predigested milk, peptonoids, soups, broths, vegetable purées, dextrinized cereals, koumyss, plasmon, tropon, tender meats, fowls, fresh fish, eggs, spinach, well-cooked rice, etc. The hygiene and life must be regulated, and one aim should be to increase vital power and resistance by all means at hand; regulate the diet so as to render the intestine a poor culture-medium, by local therapeutics to remove those products that will produce further irritation and inflammation; to inhibit their action by germ-destroying applications, and through hydrotherapy improve the internal circulation, lessen secretion and diminish peristalsis until a normal condition is reached. The most satisfactory method of treatment, and one that has proved in my hands of almost unerring value, is the method of Winternitz.

The patient, standing in a hot foot-bath at 110° F., is given the dripping sheet, commencing at a temperature of 70° F. for three minutes, this temperature to be reduced three degrees daily until 60° F. is reached. This is followed by the cold sitz bath at 80° F., reduced three degrees daily to 60° F., or even 50° F. Its duration should be ten to fifteen minutes. After the rub, the patient, without being dried, immediately occupies the cold sitz bath, is thoroughly covered and rubs the abdomen vigorously. The action of the cold water upon the sensory nerves of the skin, accompanied by friction, causes a tonic circulation of blood in the cutaneous surface, as a result of which bowel secretion is reduced, circulation modified and peristalsis checked. With a cessation or improvement of the intestinal symptoms we may move to general treatment calculated to restore the devitalized and depreciated state of the patient. In the treatment of these cases the Turkish bath, hot air and electric light bath have been much employed, in conjunction with an ice-bag applied to the stomach and bowel. The author has, however, found the use of the incandescent electric light bath until perspiration, the horizontal rain bath at 100° F. for one minute reduced to 65° for ten seconds, followed by the cold sitz bath at 60° F. for ten minutes, accompanied by vigorous friction, a

most valuable method of treatment. To enhance its effect he sometimes uses the hot foot-bath at 110° F. In conjunction with this treatment we may employ enemata of nitrate of silver, ten to thirty grains to the pint of distilled water; normal saline; boric acid, five grains to the ounce; tannic acid, one or two drachms to the pint. The author's experience has been that the best results are obtained by the use of the normal saline, followed by medicated applications, of which the best is the aqueous extract of krameria in 5 to 10 per cent. strengths, as originally suggested by Tuttle. Associated treatment materially helps, especially massage, avoiding the abdomen and lower spine. The static wave current to the abdomen is a measure of no small value.

Constipation.

Constipation may be defined as a functional inactivity, a sluggishness of, or an imperfect emptying of the bowel. This may be either due to atony of the muscular coat or deficiency of secretions. It is a symptomatic condition, having its origin in many causes, and, in its turn, provoking disease or aggravating existing conditions. It is the bane of civilization. It causes especial irritation to nervous people, and produces many unpleasant symptoms associated with the cerebral and spinal functions, especially fullness of the head, mental depression, headache and neurasthenic symptoms. It deranges the digestion, causes dyspeptic symptoms, and in many instances is mistaken for "indigestion," so-called. Through its influence the system is loaded with toxins, producing sallow skin, anæmia and a host of other conditions. It throws a great deal of the labor of elimination upon the kidney, and has, in the writer's observation, caused a form of pseudo-Bright's disease, in which a trace of albumin, cylindroids, many crystals of uric acid, oxalate of lime and indican are present. Its origin is to be most frequently found in those of sedentary habits, who lead an indoor life and who take little exercise; who wear improper clothing; who indulge in improper food and who overeat; in those who are irregular and careless in the act of defecation and who are habitual users of laxatives. The essential element in the treatment is to remove the atony of the intestine, which is found especially in neurotics and neurasthenics; to increase the secretion, thus overcoming the dry fecal mass; to strengthen the relaxed and weakened abdominal muscles. The first thing to be done is to stop the use of drugs and warm enemata, for we will find that it is to hygiene, diet, baths and electricity that we must look for a cure. Enemas and medicines aggravate the disease by causing paresis of the intestinal wall, and are apt to be followed by dilatation of the colon. Most of these cases drink little water, and for that reason they should be made to ingest large quantities, unless they are at the same time the subject of splanchnoptosis. The use of cold carbonated waters

—Vichy, seltzer, etc—*before breakfast* is more advantageous than plain. A regular hour for stools should be selected and adhered to strictly. Exercise in the open air, such as horseback riding, rowing and golf, are to be recommended, as are regular hours in eating. The diet, if possible, should be such as will leave some refuse or residue. Penzoldt suggests the following diet: 7 A.M., one glass of cold water; 8 A.M., generous breakfast of sweetened coffee, much butter, honey, graham or brown bread; 1 P.M., dinner of meat, much vegetables, salad, stewed fruit, farinaceous foods, cider or fruit juices; 7 P.M., meat with much butter, graham bread, stewed fruit; 10 P.M., before going to bed, fresh or stewed fruit. Fruits are of especial advantage, such as figs, oranges, pears, stewed prunes, baked apples, as are nuts, brown bread and molasses. No alcohol, beer or wine should be used. The application of hydrotherapy acts as a tonic to the nervous system, increases the contraction of the abdominal walls, stimulates the secretion and favors elimination. A number of methods have been suggested. Winternitz prefers the use of the dripping sheet at 60° F. for three minutes, with vigorous friction, followed by the cold sitz bath (50° to 70° F.) for two to five minutes. There is no question but what a cold sitz of short duration stimulates the muscular contraction of the intestine and increases secretion. The writer, however, has found that douches applied to the abdominal wall are more satisfactory, especially the cold fan and jet douche of brief duration to the abdominal wall and spine. Commence with the electric light bath or hot-air bath until profuse perspiration takes place. Follow with the horizontal or circular rain bath at 105° F. for one minute, pressure twenty pounds; then the fan douche to the body for one-fourth minute and the jet douche to the spine for one-fourth minute, commencing at a temperature of 70° F., twenty pounds pressure, reducing the temperature two degrees daily to 60° F., and increasing the pressure two pounds daily until thirty pounds is reached. As soon as the patient has reached this point, give the following vigorous treatment: Electric light bath or hot air to profuse perspiration; circular rain bath, 105° F., pressure twenty pounds, for one minute; Scottish jet douche to the colon and abdominal wall, alternating between 108° and 70° F., five and fifteen seconds each, under a pressure of ten to fifteen pounds for one minute. Increase the hot water a degree daily until 115° F. is reached; decrease the cold water one degree daily to 60° F., increase the pressure one to two pounds daily until twenty-five to thirty pounds is registered. Finish the treatment with the fan douche all over the body at 60° F. for ten to fifteen seconds. Care should be taken in administering the douches to always extend them so as to cover the region of the liver. It will be noticed that the application of a jet of very cold or very hot water to the abdomen causes instant and vigorous contraction of the ab-

dominal muscles and excites intestinal peristalsis. In spastic conditions of the intestine dependent largely upon nervous manifestations, it will be found best to avoid for a time the application of the cold douche to the abdominal wall, and simply use the hot. In certain cases of anemia, especially in women, it will be found advantageous to utilize the following measure: Sitz bath at 80° F. for two to three minutes, followed by the fan douche to the abdomen, 70° F., twenty pounds pressure, for one-half minute. Reduce the temperature of the sitz bath and douche two degrees daily until 60° F. is reached. The perineal douche applied to the perineum and anal region will often stimulate immediate peristaltic action when used at 60° F. for one to three minutes.

As previously stated, the use of enemas is to be avoided, but if they have to be used it is preferable to use the normal saline solutions, warmed, finishing with a temperature of 70° to 65° F.

In old cases of constipation accompanied by gastric derangements it has been often noted that lavage will produce activity of the intestine, and in this way overcome the associated bowel condition, as well as cleansing the stomach. Some foreign writers use lavage as a hydrotherapeutic measure in the treatment of constipation. All rectal diseases must be corrected, such as hemorrhoids, fissure, etc.

As associated measures of great value, the local application of the static wave current, especially in those cases where gastro-intestinal catarrh is present; the galvanic current, applied over the abdomen and lower spine, or, what is better, the slowly-interrupted sinusoidal current to the musculature of intestine and abdominal wall. In the writer's opinion, the least harmful laxative is cascara sagrada.

Neuroses of the Stomach and Intestines.

Under the above title we will consider a large number of affections having as their origin disorders of the motor, sensory and secretory functions of the stomach and intestines, which are considered together for brevity's sake and because they have, as a rule, to be treated by the same general methods. The treatment of the various disorders enumerated is similar, but it must not be supposed that it consists of fixed, cut-and-dried plans that should not be modified. When we deal with the nervous, neurotic, neurasthenic, hysteric and others of this type we have to consider each case as an entity, and this applies with full force to those nervous affections in which the hollow viscera of the stomach and bowel are involved. Many of them are minor ailments that cause the sufferer much discomfort, but should none the less receive our careful consideration. These have no known anatomic basis. Some have been considered under "States of Hypersecretion" and "States of Hyposecretion."

Gastralgia, or true neuralgia of the stomach, has been in my ex-

perience a rather rare affection. An analysis should always be made to ascertain as to whether hyperchlorhydria exists; diagnose by exclusion.

Gastric hyperesthesia is, as Rugel says, "a morbidly increased sensibility of the sensory nerves of the stomach." This occurs nearly always after eating, thus differentiating the pain from that of gastralgia. I have seen several cases, and all were in markedly neurasthenic persons. The chemic and other findings are never in proportion to the tenderness. In the same line are the peculiar sensations of "sinking at the stomach," heat and cold, etc.

The *derangements of appetite, anorexia*, a loss of the desire for food; *hyporexia*, an early sensation of satisfaction or satiety; *bulimia*, an exaggerated or insatiable desire for food; *akoria*, a lack of the normal feeling of satiety; *polyphagia*, the eating of too much; *parorexia*, or altered appetite, will often be found to be accompanied by depressed nervous and psychic states, the treatment of which will be the guide. Some of these conditions may continue until life itself is at stake. These cases need institutional treatment and care.

The *motor neuroses* of the stomach are affections brought about by varying actions of the muscular apparatus of the organ. *Gastrospasm*, a spasm or cramp of the entire stomach; *cardiospasm*, a cramp of the muscles of the cardiac orifice; *pylorospasm*, a cramp of the pylorus; *hyperperistalsis*, or peristaltic unrest, an increase of the rhythmic contractions of the stomach of which the patient is aware.

Reflex and *nervous* vomiting arise from some cause or irritant in other organs or distant parts of the body, particularly the genital organs, the eye, pharynx, and in rare cases diseases of the nose. The vomiting is usually painless, produces little depression, and the patients enjoy fairly good health. Psychic disturbances easily provoke. In this class we may mention the "periodic or cyclic vomiting of children" and the periodic vomiting of adults.

Rumination, merycism, or "chewing the cud," is the raising of the food without nausea, remasticating and then swallowing. This occurs normally in the cow. *Regurgitation* is a similar habit, except that the food is rejected. It has been known to occur from imitation.

Enteralgia is a rare neuralgia of the intestines. Closely simulating it, and very difficult of differentiation, is *intestinal colic*, a cramp or pain of intense character located in the intestines, usually brought about by some irritant in the bowel. Gaseous distension is usually present. *Meteorism, tympanites*, are gaseous distensions of the bowel, the former localized, the latter diffuse. *Peristaltic unrest* consists of increased peristaltic movements, and is more common than the gastric.

A careful study of each case must be made, including a quantitative analysis of the gastric contents, after which hygienic laws applicable to the case must be outlined. The treatment should be based

upon attention to the local condition, while at the same time general tonic and roborant methods are utilized with a view of reconstructing the nervous and general health, improving assimilation, stimulating metabolism and increasing the hemic functions. To this end a well-ordered life, with plenty of sleep, freedom from care and worries to the extent of a partial or complete rest-cure may have to be instituted, but it should be borne in mind that each case is a law unto itself and must be so met. The local treatment, where conditions of pain, unrest and discomfort exist, should consist of the application of the hot fomentation for fifteen or twenty minutes, followed by the abdominal compress for an hour. This may be repeated as frequently as every thirty to sixty minutes, and the writer has seen attacks of gastralgia promptly relieved by its application. Sometimes the drinking of very hot water or the use of a very hot high saline enema will promptly check the condition. Variations in secretions, loss and change of appetite, can be satisfactorily influenced by the application of the ice-bag over the stomach for an hour before meals. Lavage with alternate hot and cold water will exercise the same toning influence as that of the Scottish douche to the external surface. We must, however, look to general treatment for a radical relief of these conditions. Where one has no access to institutional treatment we may employ the full dry pack for thirty to sixty minutes, followed by the dripping sheet at a temperature of 70° F. for three minutes, reducing the temperature two degrees daily until 60° F. is reached. In institutions the hot-air bath or the incandescent electric light bath is preferred to the pack, and once having established the patient's reactive capacity we may give him the electric light bath to the point of free perspiration, followed by the horizontal or circular rain bath at 105° for one or two minutes. Follow this with the fan douche to the entire body for one-fourth minute and the jet douche to the spine for one-fourth minute at 70° F., under a pressure of twenty pounds; reduce the temperature two degrees daily to 60° F. and increase the pressure two pounds daily until thirty pounds is registered. We may now proceed to a strong and stimulating measure needed by these cases. The electric light bath is given until free perspiration takes place; then the horizontal or circular rain bath at 100° to 105° F. for one and one-half minutes; the fan douche to the entire body one-fourth minute; the jet douche to the abdominal wall ten seconds; jet douche to the spine for one-fourth minute. Commence these douches at a temperature of 70° F., fifteen pounds pressure; reduce temperature one degree daily to 60° F., or even 50° F. where the patient reacts well; increase the pressure two pounds daily until twenty-five to thirty pounds is registered.

These cases are helped by a sojourn at the seashore and surf bathing. This is especially beneficial as a "finishing" treatment, tend-

ing as it does to give the patient a further rest from the cares and anxieties of life under most favorable and hygienic conditions.

Certain associated treatments are of unquestioned value, especially the use of galvanism applied over the abdomen and up and down the spine; the static wave current will oftentimes materially aid in relieving the local condition; so will mechanical massage, and vibration and manual massage applied to the abdomen and general system.

CHAPTER XIII

DISEASES OF THE NASO-PHARYNX, LARYNX AND CHEST.

Acute Rhinitis; Acute Pharyngitis; Acute Tonsillitis; Acute Laryngitis; and the Treatment of Post-Operative Inflammations.

Acute colds and acute sore throats are embraced under the above general heading. They are acute catarrhal inflammations of the mucous membrane of the nose, tonsils, uvula, soft palate, pharynx and larynx, being generally characterized by fever, painful deglutition, free discharge, coughing and a desire to clear the throat. The discharges are, as a rule, fluid, watery or mucous, very free in quantity. They have their most frequent origin in atmospheric changes, especially those due to exposure of the head and neck to draughts of cold air. A favorite method of acquisition is riding in street-cars while perspiring, or the practice of wearing thin soles and stockings and subjecting the feet to cold and dampness. This is especially frequent with women. They sometimes arise from irritant vapors, dust, etc. In the treatment of these acute conditions, where the condition is not severe, it will be sufficient to simply diminish the quantity of food eaten, give rest to the throat and nose, spray them with antiseptics, open the bowels freely, and drink largely of carbonated water, an excellent example of which is equal parts of plain and Vichy water. If the case is severe it may become necessary for the patient to be put to bed. In any event general and local measures should be adopted. Where one has no access to institutional treatment an excellent measure is the use of the hot full bath, commencing at a temperature of 100° F. and rapidly increasing to 108° or 110° F., if possible. This should be followed by a very brief cold application—that is to say, a shower or cold sponge at a temperature of 70° to 60° F. This treatment is best given just before retiring, and after its administration the patient should be at once removed to bed, carefully covered and given a very hot foot-bath at 110° to 115° F. for ten minutes. There is no known home method with which I am familiar that will so surely abort these acute inflammations as the method above suggested. Where this is not accessible we may employ the full dry pack for thirty minutes, or the full wet pack for one hour, followed by the cold sponge at 60° F. and the hot foot-bath at 110° to 115° F. for ten minutes. An excellent measure to relieve and abort the early stage of these inflammations is the Turkish bath, accom-

panied by free water-drinking. In sanatoria we employ the hot-air bath, electric light bath or superheated dry hot air to free perspiration, continued for several minutes, followed by the circular or horizontal rain bath at 104° for one minute under pressure of thirty pounds, reduced to 65° F. for one-third minute. With vigorous persons this may be followed by the use of the jet douche to the spine for ten seconds at 60° F.

Local measures serve to relieve a great deal of the discomfort and hasten recovery. We may employ hot alkaline gargles, such as the normal salt solution, Seiler's solution or antiseptic steam inhalations. Another excellent method is the fomentation to the face and neck every three hours, followed by the cold throat compress between times, or, what is better, the author's throat compress. Where the inflammation is *very severe* a partially filled ice-bag may be applied over the throat compress.

Chronic Rhinitis; Chronic Pharyngitis; "Clergyman's Sore Throat"; Chronic Tonsillitis; Chronic Laryngitis.

These are chronic inflammations of the mucous membrane lining the nose, pharynx, tonsil and larynx, which are characterized by a sensation of fullness, discomfort, increased secretion and perversion of the senses of smell and hearing and a change in the character of the voice. It most frequently results from repeated attacks of acute inflammation or from general depraved states. Certain preliminary measures are necessary for the successful treatment of these conditions. Where there are any hypertrophies, vegetations, enlarged tonsils, etc., these should be removed or corrected and at the same time local applications of nitrate of silver, picratol, argyrol or other medicinal measures utilized. Care must be taken to prevent acute attacks, and should they occur must be immediately treated. It has been the writer's experience that one of the most potent causes in these most troublesome affections has been the common and prevalent habit of mouth-breathing, which can at the present day be most certainly and surely overcome by means of simple mechanical devices which compel breathing through the normal channels. Especial care should be taken to secure proper digestion and elimination. Where we can build up the general health, secure plenty of open-air exercise or the use of gymnastics, we can frequently train the body to stand the exposures that would under ordinary circumstances produce severe acute attacks or gravely aggravate chronic conditions. To secure this desideratum it is essential that the activity of the skin be maintained at the highest, and that at the same time the cutaneous circulation must possess a tone that is not easily influenced by changes in temperature. Chronic inflammations of the upper respiratory passages are best met by measures general and local. At home we may pre-

scribe the use of the hot full bath at 102° to 105° F. for ten minutes, followed by the shower bath at 80° F. for one-half minute, reducing same two degrees daily until 60° F. is reached, followed by the hot foot-bath at 110° to 115° F. for ten minutes. To enhance and retain the circulation actively in the feet, the foot-bath should be followed by a douche of cold water over the feet. This treatment is best taken at bedtime every other night, the intervening nights being devoted to the use of the oil rub. Where such a treatment is inaccessible we may employ the full wet pack at 65° F. for one hour, followed by the cold half bath at 70° F. for three minutes, using vigorous friction. Reduce temperature of pack and half bath one degree daily until 60° F. is reached. In institutions the most satisfactory method is the following: The hot-air bath, superheated dry hot air, and, what is probably the best, the electric light bath until profuse perspiration. Follow this treatment by the horizontal or circular rain bath at a temperature of 100° to 102° F. for one minute, reduced to 70° F. for one-fourth minute, twenty pounds pressure. Reduce temperature one degree and increase pressure one pound daily until a temperature of 60° F. and a pressure of thirty pounds are registered. As soon as the patient responds well we may add to the electric light bath the following treatment: Horizontal rain bath to body for one-fourth minute; the jet douche to the spine one-fourth minute, especial care being taken to apply thoroughly to the cervical region. Each one of these methods should be followed by the cold foot-bath at 60° to 50° F. for one-fourth to one-half minute. Patients suffering from these chronic inflammatory troubles secure great benefit and help, oftentimes a permanent cure, from a sojourn at the seashore for several months, where they can utilize all the advantages that arise from freedom from business and affairs, pleasant recreation and surf bathing. Not only do we have the advantage in these cases of the percussory influence of the cold and agitated sea water upon the skin surface, but the cleansing and healing influence of the strong saline that inadvertently enters the nose, mouth and throat.

Local measures are most valuable. The hot compress as hot as can be borne applied to the face, over the nose, around the throat and to the cervical spine, followed by the cold compress at 60° F. applied to the same regions. In addition to this treatment, the stimulating throat compress should be worn during the night. Much relief will be derived from a thorough cleansing of the nose and throat with alkaline sprays, followed by those containing menthol, camphor and the essential oils dissolved in alboline.

Croupous Laryngitis.

True or membranous croup is an acute inflammation of the mucous membrane of the larynx attended with the exudation of a tough

secretion or false membrane, the occurrence of spasm of the glottis, and characterized by febrile reaction, frequent peculiar cough, dyspnea and a tendency toward death by asphyxia. The affection is very fatal, and the danger is great in proportion to the age and feebleness of the patient. Hydrotherapy may contribute *slightly toward relieving the symptoms*. The hot full bath at 102° to 105° F., with a cold compress to the head, followed by a cold compress at 60° F. applied over the larynx and changed every half hour, will frequently prove of service. No practitioner should fail to administer, when in doubt, the diphtheritic antitoxin, and to have readily accessible every means for prompt intubation.

Spasmodic Laryngitis; Laryngismus Stridulus.

False or catarrhal croup is a catarrhal inflammation of the mucous membrane of the larynx, associated with temporary spasmodic closure of the glottis, characterized by paroxysmal coughing, difficulty of breathing and attacks of threatened suffocation. Laryngismus stridulus is a spasm of the muscles of the larynx, characterized by sudden dyspnea and deficient oxygenation of the blood. These require one and the same treatment, and will be therefore considered together. The attacks occur most frequently in children. The preventive treatment of these conditions should have for its object the removal of all enlarged tonsils, adenoids and nasal obstructions of every kind. During the paroxysm the child should be at once placed in a hot full bath and at the same time a cold compress at 60° to 50° F. applied over the larynx. This may be used in conjunction with spraying of the throat with a 2 per cent. aqueous solution of cocaine. As soon as the paroxysm is relieved the patient may be removed to bed and a cold throat compress at 50° to 40° F. applied to the neck. This should be renewed at the end of every three hours, at which time a hot fomentation may be then applied for one-half to one minute over the larynx and two to three minutes over the cervical spine, followed again by the cold throat compress. Kellogg suggests that during the spasm or paroxysm the chest be percussed with the wet end of a cold towel o cold water be dashed over the chest. During the interparoxysmal period steam inhalations, to which some creosote has been added, will often prove comforting and satisfactory. As soon as improvement takes place we must reconstruct the general health and prevent attacks by hardening the skin by the use of daily cold tonic measures. Even infants can be *gradually and systematically trained* to stand cold water, but it takes patience, firmness and insistence on the part of the attending physician to overcome the unfounded fear of the baby of cold water.

Acute Bronchitis; Capillary Bronchitis.

Acute bronchial catarrh is an acute catarrhal inflammation of the bronchial tubes, characterized by fever, pain and constriction of the chest, oppression in breathing and a more or less profuse expectoration. It is found frequently in children and in the aged and in those who are exposed to an atmosphere that is cold and damp. It occurs especially after measles and influenza, its exciting cause being micro-organisms; many staphylococci and streptococci are found in the sputum. As a rule its mortality is small, only very aged and feeble persons succumbing. The patient should be, as a rule, confined to a well-ventilated warm room, and if feeble placed in bed; restricted soft or liquid diet may be prescribed and calomel administered. The first aim should be the securing of free skin action, as this will relieve the visceral congestion and eliminate toxins. In practice we may employ the following procedure: Allow the patient to sip a glass of very hot water, after which we may use either the full dry pack for thirty minutes, the wet sheet pack at 70° F. for one hour, or a hot full bath at 104° to 105° F. for ten minutes, in each instance removing the patient to bed and following with the cold sponge at 60° F., or the dripping sheet at 70° for three minutes. This treatment may be repeated once or twice daily if necessary, though the latter is not suggested. Where we have to deal with an irritable, tenacious and weakening cough it will be found advantageous to allow the patient to sip and gargle the throat with very hot water or inhale steam. Much benefit will be derived from the use of the chest compress in addition to the above measures. There is no question but what many cases of acute bronchitis could be greatly modified, cut short or even aborted by having recourse at its *immediate commencement* to the Turkish bath. In institutional treatment we find the electric light bath to the point of profuse perspiration, followed by the dripping sheet at 70° to 60° F. for three minutes, or the horizontal or circular rain bath, 70° to 60° F., for one-fourth minute, most useful. The author has, however, allowed superheated dry hot air to supersede the other methods. The patient is placed in the body apparatus for twenty to forty minutes at temperatures ranging from 250° to 300° F., especial care being taken to place a cold compress or ice-bag upon the head. The patient is removed from the apparatus and allowed to perspire in a blanket pack for ten or fifteen minutes, after which the horizontal or circular rain bath at 70° F. for twenty seconds is then administered. In my hands nothing has equalled these measures in the prevention and cure of bronchial affections.

What has been said of acute bronchitis is equally applicable to *capillary bronchitis*, an acute catarrhal inflammation of the mucous membrane of the bronchioles, and characterized by fever, impeded

respiration, slight cough and scanty expectoration. Huebner[1] has suggested the following plan of treatment in the suffocative stage of this disease in children: Half a kilo of fresh mustard flour is thoroughly stirred into one and one-half litres of warm water until the fumes arising from the mixture become irritating to the eyes. This requires about ten minutes. A sheet sufficiently large to envelop the child is then saturated in this mixture, wring out and spread on a blanket. On this the child is placed naked, then closely covered by the sheet from the feet to the neck, the blanket being brought over all, so that a moist mustard full pack is the result. In this the child should remain from ten to fifteen minutes, until it shows by its restlessness that the irritation of the skin is becoming pronounced. It is then quickly removed from the pack, washed in plain warm water to remove all trace of mustard, and then placed in a warm pack made by wringing a sheet out of plain water, and covered by a blanket. In this pack the child should be left for one or two hours, the length of time being controlled by the temperature of the child, which is likely to increase. When this occurs, or when a very profuse perspiration appears, the child should be removed, again bathed in plain warm water, then dried, clothed in an ordinary gown and returned to bed, where it should be left undisturbed. The procedure should not be repeated within twenty-four hours, but in severe or prolonged cases may be employed daily for three or four days. Though more tedious, it is applicable under a greater variety of circumstances than the hot mustard bath, and, as it is better borne, allows time for a more pronounced effect.

Chronic Bronchitis; Fibrinous Bronchitis.

Chronic bronchial catarrh is a chronic inflammation of the mucous membrane of the larger and middle-sized bronchial tubes, characterized by cough and more or less profuse expectoration, usually following a succession of acute attacks. It is common in the aged, accompanies the infections, and may arise indirectly from gout, alcohol rheumatism or syphilis. It is frequently associated with chronic gastric catarrh. The treatment of this condition should bear in mind the causal relations above mentioned, the treatment of which will be found under their respective headings. In all cases an equable temperature of the chest should be secured, the best garments to be worn being woolen ones of medium weight. Care should be exercised not to dress too heavily, owing to the fact that upon entering warm rooms slight perspiration is apt to take place, which would be followed by chilling upon entering the external colder air. Draughts, especially damp, cold weather, wet feet and overexertion must be guarded against. The writer has had an extended experience in the treatment

[1] Therapie der Gegenwart, 1901, p. 1.

of chronic bronchitis, and believes that the basis of restoration of the bronchial tubes is the restoration of the normal general tone, while at the same time we lessen the local inflammation. The aim should then be to remove all causal factors, at the same time reducing the local inflammation and building up the general health. There is no question but what the administration of alkaline waters in considerable volume is of great benefit to those afflicted with this disease. Many suggest the use of water of alkaline mineral springs, but the writer has found the ordinary alkalies, well diluted, to be just as valuable as the much-vaunted waters. The diet should be reconstructive, and contain a large quantity of fats, butter, milk, cream, olive oil, mayonnaise dressing and other foods of a similar nature. The oil rub at night, used in conjunction with hydrotherapy, is a valuable measure. Care should be taken to correct nasal, tonsillar and pharyngeal troubles, as these are weak spots tending to accentuate and perpetuate the bronchial condition. These cases should be taught respiratory gymnastics, especial benefit being derived from the outward and inward movements of the arms. It is my custom to suggest deep inhalations half a dozen times during the day. Much good can frequently be derived from the correction of mouth breathing, thus preventing the irritating effects of improperly heated and moistened air entering the bronchial tubes. As chronic bronchitis occurs more often in the aged, it is well to commence with very mild measures, carefully securing reaction in each instance. The writer generally commences with the use of the electric light bath until the patient is warm, after which there is administered a salt rub, followed by a rapid cold sponge, the temperature of the water being at 80° F.; reduce the temperature two degrees daily to 70° F. We may now proceed to the use of the following method: Electric light bath, hot air or dry pack until perspiration just commences, then the dripping sheet at 70° F. for three minutes, accompanied by vigorous friction. Rub well afterward with a crash towel until reaction is secured.

In some cases this is followed by a rapid oil rub. This treatment should be repeated daily, reducing one degree each treatment until 60° F. is reached, at which time we may move up another step, as follows: The electric light bath or hot air until commencing perspiration, followed by the horizontal or circular rain bath at 100° to 104° F. for one to one and one-half minutes, twenty pounds pressure; reduce to 70° F. for one-third minute. Reduce the temperature one degree daily until 60° F. is reached and increase the pressure one pound until thirty pounds is registered on the gauge. These cases are always best treated in sanatoria. It is astonishing to notice, where the treatment is carried out carefully, thoughtfully and painstakingly, how the skin of these individuals will lose its gray, greasy, leathery look, assume a softer and better character; how the color will come to the

surface; how the irritating and hacking cough will lessen; how expectoration will become freer and finally cease; how the appetite, digestion and elimination pick up. It is a metamorphosis not as rapid, but as pleasing, as those that arose from the magic influence of Aladdin's lamp.

Pulmonary Congestion.

Pulmonary engorgement, hypostatic congestion, is an increase or abnormal fullness of the capillaries surrounding the air cells; active when the result of accelerated circulation and passive when caused by an impeded outflow from these vessels. Active congestion of the lung most often occurs from prolonged exposure to cold, over-exertion or the inhalation of cold or hot air. The writer has seen two cases due to prolonged swimming in cold water. The passive arises in those obstructed conditions in which we have to deal with valvular disease and dilated heart, nephritis, or in the infectious fevers. In treatment these conditions must be taken into consideration, and where they act as causal factors appropriate measures must be adopted.

In acute congestion the endeavor should be made to withdraw the blood from the lung and cause a contraction of the capillary blood-vessels. This is best accomplished by rest in bed, with frequent changes of position. Administer a very hot foot-bath (110° to 115° F.) for fifteen to twenty minutes, with the legs immersed to the knee. This should be followed by the hot dry half pack or the hot wet half pack applied to the lower limbs and as high as the umbilicus. At the same time we may apply the cold chest compress, 50° to 60° F., and repeated as necessary, from twenty to thirty minutes, or the double-column Chapman hot-water bag to the upper dorsal spine. There is no objection to using the cold chest compress anteriorly and the Chapman hot-water bag to the dorsal spine posteriorly.

In the passive or hypostatic form, which usually occurs in febrile conditions or systemic disease, much can be accomplished by frequent change in position. Where hydrotherapy is employed in fevers hypostatic congestion is a rarity. When conditions of obstructed circulation or nephritis occur, these diseases must be treated in order to overcome the condition. The best treatment of passive congestion of the lung is the application of the hot fomentation for ten minutes to the entire chest, followed by the cold chest compress at 60° F., renewed every three hours. Before every application of the compress the fomentation must be repeated.

Pulmonary Edema.

Pulmonary edema is an exudation of serum into the pulmonary tissue and alveoli, characterized by frothy, blood-streaked expectoration, cough and dyspnea. It is a grave condition, and is in the majo-

ity of instances a symptom of some acute or chronic disease. For that reason remedial measures offer little. The conditions that produce the trouble, whether they be cardiac disease, nephritis, or an infectious disease, are the ones to be treated. In this disease, as in pulmonary congestion, we may employ the hot foot-bath to the knee at 110° to 115° F. for fifteen to twenty minutes, followed by the hot dry half pack, together with the cold chest compress at 60° for twenty to thirty minutes, repeated as often as necessary. To sustain the heart the ice-bag should be applied to the precordium, and strychnia and atropine injected hypodermically. Little can be accomplished by this treatment unless other measures reaching the causal conditions are successful in removing them.

Hemoptysis—Pulmonary Hemorrhage.

Hemoptysis is the expectoration of blood—in fact, is a pulmonary hemorrhage—which may arise from the bronchial tubes or from the broncho-pulmonary tissues. It is usually a symptom of some other disease, generally tuberculosis, or may occur from other causes, and where these exist the treatment of the causal condition must be taken into consideration. Pulmonary hemoptysis demands, in the writer's opinion, an immediate hypodermic injection of morphine and atropia, without the addition of any other drug, ergot and its ilk being valueless. Examine the nose and throat for bleeding points, which, if they exist, touch with a styptic. Rest in bed is imperatively demanded in a room that is kept cool. The diet should be liquid and as little as is consistent. The swallowing of small pieces of ice sometimes helps, and all hot or warm drinks should be avoided. If the hemorrhage is actively taking place, a bandage should be applied to the legs to prevent, as much as possible, the return of blood toward the lungs, and partially arresting the return flow. A tumbler of ice water in which a tablespoonful of salt has been dissolved sometimes helps. Apply ice-bag to the supraclavicular fossa and the cold chest compress at 40° to 50° F. for fifteen to twenty minutes, repeating as often as is necessary. The Chapman double-column hot-water bag should be applied to the upper dorsal spine, its action being to cause a contraction of the blood-vessels entering the lung. When the hemorrhage has been checked, care must be exercised in the return to activity and in the adoption of further measures. It may be added, as a final word, that the after-treatment consists in the management of the disease causing the hemorrhage.

Lobar Pneumonia; Catarrhal Pneumonia.

Pneumonia is an acute infectious inflammation, involving the vesicular structure of the lung, rendering the alveoli impervious to air, and characterized by fever, cough, thoracic pain, dyspnea, headache,

rusty sputum and great prostration. Its origin is a specific organism, the diplococcus pneumoniæ of Fraenkel, although mixed infections occur. The seat of election and its chief effects are upon the lung, the micro-organism being found in the sputum. It is a disease of grave prognosis, the mortality of which ranges from 30 to 40 per cent. Old age and alcoholism render the prognosis bad. In no acute infectious disease does temperate living and a moral life count for as much as in an attack of acute pneumonia. One attack predisposes to another, as does exposure and debilitated conditions. The seriousness of the disease demands that we shall, from the start, use every measure that will conserve the energy and strength of the patient and at the same time enhance vitality. The patient should at once be placed in a room from which all useless objects have been removed, the temperature of the room being maintained at 65° F., with an abundance of pure warm air. The bed should be single, protected from draughts, accessible from either side, the mattress being protected by rubber cloth or sheet. The patient should be clothed in a soft flannel gown opening its entire length in front. The bedclothes must be light, the sheets changed frequently, the expectoration and discharges caught in vessels in which are antiseptic solutions and later burned. The diet should be liquid, using milk, broth, egg albumen-orange solutions, etc. Baruch recommends the use of six ounces of cold water every two hours, alternating with the same quantity of cold milk, night and day, when the patient is awake, the result of which is an enormous increase of urine, scarcely credible, even as much as 60 to 122 ounces in twenty-four hours. Todd[2] says that "six to eight ounces of water, alkalinized by adding two and one-half grains of sodium chloride and ten grains of potassium bicarbonate to the ounce, should be given every two hours." If a teaspoonful of lemon juice is added it makes a pleasant effervescent drink. The author first learned of this in 1884 from an Italian physician, and has found it a palatable beverage. There is no question but what the free ingestion of cold alkaline water is of decided benefit to these cases, in that it favors oxidation, which is so much needed, and at the same time acts as a diluent and eliminant of toxins and waste products.

Care should be exercised not to over-feed, as the loss of strength is due to poisoned nerve and muscle, and not to a lack of nutrition. It should further be borne in mind that with the loss of air, due to the involved lung structures, there is deficient oxidation in the body, and food is not utilized. It is irrational and unphysiological to feed patients large quantities of food they cannot assimilate, and this is essentially true of the acute infectious diseases. Food is best administered at periods of every three hours, care being taken to avoid a distended stomach and abdomen. "If pneumonia be regarded as a

[2] Todd, J. H. New York Medical Journal, 1891.

constitutional malady with a local lesion, then the consolidated lung no more calls for treatment than does the intestinal ulcer of typhoid fever, but the general condition of the patient is to govern in the management, and in the local changes in the thorax." In all treatment that is instituted especial care should be taken to prevent pulmonary congestion from exposure of the shoulders or chest to chill by evaporation. There is no specific treatment for pneumonia, but the patient must be carefully and closely watched and treatment adjusted to conditions. At the outset there is no question but what calomel should be prescribed in good purgative doses. The aim and object of the treatment in pneumonia is the maintenance of vital activity until opportunity has been afforded the system for the elimination of the toxins and the development of antitoxins, which assist in the suppression of the disease and bring about natural healing processes.

In hospital and private practice this is the most fatal of all acute diseases. The most striking and important similarity between this and typhoid fever is that the chief point of attack is upon the nervous system; the toxemia resulting from the life and death of the micro-organisms spends its chief force upon the nerve centers. The treatment, therefore, resolves itself into two lines—local measures, which may be adopted to lessen the production of toxic material in the lung and obviate the mechanical obstacle to respiration, and general measures, which should be directed toward minimizing the toxic effects upon the system by maintaining the highest vital resistance. Owing to the sensitiveness of the pneumococcus, local measures are essential and satisfactory.

The best local method of combating the lung condition is the use of the chest compress, which would be applied at a temperature of 60° F. and repeated every hour when awake. The efficacy of the compress is frequently enhanced by the application of a hot fomentation before every third or fourth application of the compress. Where the fever is very high the compress may be repeated as often as every twenty minutes, though, as before stated, care must be taken to avoid chilling by evaporation. The action of the compress is a good deal that of the action of cold in general in infectious diseases—stimulation and invigoration of the nerve centers by its impact upon the cutaneous surface and the reaction that follows. Reflex influences are conveyed to the lungs, and as a result congestion is lessened and expectoration increased. Upon the circulation its action is that of a cardiac tonic, first contracting the superficial blood-vessels, which is followed later by a tonic dilatation. Reflexly, heart action is benefited. Reduction of temperature is also favored by the application of the compress over the lung, this being the seat of the greatest amount of heat generation. In pneumonia cold is more valuable because of the greater danger to the patient of a persistent high temperature, which

is enfeebling the heart, mechanically overworked already. There is no question but what the life cycle of the germ is shortened by cold applications, and therefore the quantity of toxins produced lessened. In the early stage of the disease we do not expect cardiac collapse, but should this be threatened apply the ice-bag over the heart for periods ranging from ten to fifteen minutes every hour, repeated as often as is necessary.

Dr. T. J. Mays, of Philadelphia, advocates the use of ice-bags to the chest in pneumonia. He says:

"Very often it is found that the application of ice to an affected spot is immediately followed by a marked lowering of the temperature and improvement in the physical signs in the part. When we come to compare the results of the ice-cold treatment of pneumonia with those that have been obtained from other forms of treatment, it is safe to say that the former is infinitely more satisfactory than the latter. Cold reduces the pyrexia, strengthens the pulse, tones up the heart, diminishes the pain in the chest, alleviates the difficulty of breathing and gives greater general comfort to the patient. It is capable, however, of doing a great deal more. By virtue of its power to stimulate nerve function and to contract small blood-vessels it promotes the pulmonary circulation, relieves stasis, hastens resolution and disperses the products of exudation."

Lees[1] lays down the following rules for guidance in the use of the ice-bag:

"1. Apply the ice-bag over the dull area, and especially over the advancing edge of the consolidation.

"2. If the area is large, use two ice-bags, or even three.

"3. Expect to find a distinct local effect (less bronchial breathing and lesser rales) on careful physical examination after the ice has been applied for twenty-four hours.

"4. If fresh areas of consolidation develop use additional ice-bags; four or even more may be used in a bad case. Correct dosage is as important as with drugs.

"5. Apply hot-water bottles to the feet and legs. In children apply these before applying the ice.

"6. Examine the signs twice daily and shift the ice-bags accordingly.

"7. If pericarditis is present as a complication, place an ice-bag over the heart.

"8. If the temperature is below 99° F., or if the hands are cold or the lips blue, remove the bags for an hour, then replace them and use them for two- or three-hour periods, with one- or two-hour intervals.

"9. In severe cases with cyanosis and with a rapid, feeble pulse, consider whether leeches would not relieve the right heart.

"10. Pneumonia treated with ice within twenty-four hours after the rigor may sometimes be aborted."

In this connection Kellogg says that "several ice-bags may be used

1 "Lees's System of Physiological Therapeutics," Vol. IX.

in place of the cold compress, but the bag should be removed at least every half-hour and the chest rubbed until red and warm to maintain surface circulation and skin reflexes." In this the author thoroughly agrees: its omission is a mistake. In bad cases in children the full hot bath, 102° F. or hotter, may be employed for two to five minutes, followed in its turn by the chest compress at 70° to 65° F. for twenty to thirty minutes. The preliminary hot application dilates the peripheral blood-vessels and relieves the heart.

That the chest compress meets every indication can be readily appreciated when we stop and reflect that by its direct action it lowers the bacterial life and activity, thus diminishing the development of toxins; by tonically dilating the superficial blood-vessels of the chest congestion is relieved and dyspnea lessened; the heart and vasomotors are stimulated, the pulse strengthened, its dicrotic character removed, its rate lowered and size increased; the bettered and less obstructed circulation, together with the ingested alkaline beverages, raises blood pressure, increases the urine and thus removes the toxins present; perspiration is induced, heat loss favored and maintained by the slowly evaporating moisture through the flannel covering of the compress; the shock of the impact of cold upon the peripheral nerve terminations rouses and stimulates the entire central and vegetative nervous systems, thus fulfilling every indication and need.

In many cases the use of the local measures above indicated will be all that is necessary, although two or three times a day we may increase the vital strength of the patient by using the cold sponge applied to the extremities, although many writers do not deem this an essential feature.

Loomis[4] says that in *atrophics* he employs the full bath at 103° F. or more when patients are delirious, after which they are sponged regularly when the temperature is 102° F. Sweating is often imperative in these cases, and he employs the following method: Sweating may be induced by the hot (110° to 120° F.) foot-bath given in bed without any disturbance to the patient. The patient, in a nude condition, lies between blankets with his knees flexed, his feet in the tub, which has been placed under the blanket, the long axis being in the line of the patient's body and legs; another blanket passes from under the tub up over the end and over the knees of the patient. From two to five blankets, or a fewer number of blankets and a rubber sheet, are then placed over the patient, extending from head to foot and tucked around the patient. The tub is at first filled half-full of hot water, in which a heaping tablespoonful of mustard has been dissolved and hotter water added as indicated. The bath is kept up for from thirty to forty-five minutes, according to the amount of sweating produced. During the application of the bath cold cloths

4 Loomis, H. P.: "Practical Medicine Series of Year-Books," 1906.

wring out of ice-water or the ice-cap are kept constantly on the head of the patient.

The cold full bath has been used in hospital practice by a number of physicians, but the writer is of the opinion that the full cold bath is hardly as satisfactory in this disease as in typhoid; in fact, he agrees with Baruch, that we will find in the compress all that is necessary to overcome the disease, combat the symptoms and maintain vital resistance. Brown[3] states that he has found the full strength Nauheim bath of signal benefit in these cases, lessening the respiration, lowering pulse-rate, strengthening the heart's action, preventing enfeeblement and dilatation. This bath's well-known action of raising the blood pressure not only takes place at the time, but is sustained for long periods afterwards.

Certain prominent symptoms may oftentimes be mitigated by the use of hydriatic measures. Where cough is constant and irritable the use of steam inhalations for ten to fifteen minutes every hour should be employed until this troublesome symptom is relieved. I have seen much benefit derived from the taking of teaspoonful doses of very hot water, it having frequently, in my experience, stopped even the cough of tubercular patients. In case of headache, insomnia, and delirium, the use of the cephalic compress, over which the cephalic coil cap is placed, will very promptly give relief, although these conditions are, as a rule, prevented by the use of the cold chest compress.

Convalescence is tedious, and care should be exercised in getting the patient upon his feet, especial attention being paid to the condition of the pulse and heart.

Behrmann[4] says that after long experience with hydrotherapy in pneumonia he has found it the best method. When the acute stage terminates and convalescence makes no progress, as shown by increased evening temperature, rhonchi, dull areas, irritability, increased thirst and decreased perspiration, vigorous measures are needed. If the temperature is 100.4° F. or higher, use chest pack re-wet every two, three or four hours in water at 68° to 75° F. (20° to 25° C.) for one hour, rubbing the patient dry after each application. If there is marked differences between auscultation and percussion, and the temperature is normal or subnormal, with rhonchi and dulness, wet the pack or compress in water at 86° to 91.4° F. (30° to 33° C.), or even 100.4° F. (38° C.), using it the same length of time.

Gradually increased diet, which should be highly nutritious, together with tonics of iron, quinine, strychnine, hypophosphites, etc., is indicated. When the patient is able to be about general tonic measures should be at once administered, the best of which are the incandescent electric light bath, followed by the dripping sheet, rain

3 Brown, Philip King: American Medicine, September, 1905.
4 Blume: Lehr. der Hydrotherapie, 1904.

bath, jet douches, or some other well-known method. Where consolidation continues the local application to the spot of the fomentation will assist materially in resolution. I have also found the galvanic current of considerable value in overcoming this condition. Many writers recommend blisters and tincture of iodine.

Catarrhal pneumonia may be treated in the same general manner as lobar pneumonia.

Asthma; Hay Fever; Hay Asthma.

Bronchial asthma is a paroxysmal, spasmodic contraction of the muscular layer of the smaller bronchial tubes, characterized by more or less frequent spasmodic attacks of distressing dyspnea and usually accompanied by chronic bronchitis. This neurosis of the respiratory apparatus may result from either local or general conditions, especially those that have an influence upon the nervous system. These cases are especially sensitive to atmospheric changes, and easily catch cold, the result of which is likely to be an attack or paroxysm of the affection. Many cases have peculiar idiosyncrasies that will cause a paroxysm. The disease is essentially a chronic one, and as a rule perfect recovery seldom occurs save in those cases that are due to general conditions or to reflex causes. The better the general health, the better the condition of the nervous system, the less tendency there is to attacks. Drug medication has proved itself of comparatively little value during the acute or chronic stage, and of the acute stage this may likewise be said of hydrotherapy. Our aim should be between attacks to build up the general health, increase the nerve tonus and so harden the integument as to reduce the susceptibility of the patient to a minimum. By these means we remove the most fertile causes of the attacks. These cases are very susceptible to cold water, and must be trained with great care to stand its application; and as its value is unquestioned it becomes a necessary factor in the treatment of the case.

During the paroxysm relax the patient by immersion in a hot full bath (104° F. or higher), or apply the fomentation to chest at 140° to 160° F., first posteriorly then anteriorly, until relief is obtained. In the interparoxysmal or chronic stage apply the fomentation at 140° F. night and morning, wearing between times both day and night a stimulating compress, the temperature of which should be at the start 85° F.; gradually reduce the temperature one degree daily until 65° F. is reached. Another excellent method is to employ the full hot bath, commencing with the neutral temperature of 95° F. and increase two degrees daily to 104° F. or higher for fifteen to twenty minutes, followed by the affusion to the abdomen of the water at 55° F. The best way is to allow the hot water to run out until there is only six inches in the tub, at which time the affusion is given.

while the patient is sitting in the water. It causes deep inspiration and expiration, loosens and aids expectoration, relieves fullness and stimulates intestinal activity. In institutional cases we may commence with the electric light bath until perspiration takes place; remove the patient from this and give an alcohol rub. He should now lie down and carefully avoid any chilling.

The writer wishes to say in passing that it is his opinion that the electric light bath possesses unusual efficiency in the treatment of this disease. He has tried carefully to analyze in what manner this takes place, and has been unable to reach any exact or definite conclusion, but the *clinical fact* remains that it is the most satisfactory treatment we have along hydrotherapeutic lines. After we have given two of these treatments commence with the cold sponge at 80° F., rapidly performed, starting with the extremities and terminating with the chest. As soon as this is well borne the water may be gradually dropped one degree a day until 70° F. is reached. Continue electric light bath and substitute for the cold sponge the following: The dripping sheet at 70° F. for two minutes with vigorous friction, the patient during its application standing in a hot foot-bath just as hot as can be borne. As soon as satisfactory reaction is obtained the following treatment, which has given the author much satisfaction, may be instituted. The electric light bath until free perspiration takes place, followed by the circular rain bath at 104° to 105° F. for one minute, reduced to 70° F. for one-fourth minute, followed by the fan douche to the back of the chest at 70° F. for one-fourth minute. The pressure should commence at about fifteen pounds and be cautiously and gradually raised to not exceed thirty pounds. Foreign writers recommend the cold chest compress or pack, well protected, and continued for quite a length of time.

As associated measures of considerable value we may mention treatment of any affection of the nose or throat that may exist. Mechanical vibration systematically applied, as well as the static wave current, directly to the chest walls, will prove additional aids in treatment. I have seen some good results come from the long-continued administration of iodine and arsenic. Digestive, pelvic and rectal lesions, when corrected, sometimes result in unexpected benefit.

The treatment above outlined is also applicable to *hay fever*, hay asthma and some specific catarrhal inflammation of the upper air-passages occurring during the "hay fever season"—that is to say, during the time of the presence of certain pollens in the air, the result of their action being to produce cough and difficult respiration. Young subjects may at once be placed upon the full treatment suggested. Care should be taken to keep the air-passages clean with alkaline sprays; limit the diet, from which meat has been wholly removed; increase the drinking of water, correct digestive disturbances and

overcome constipation. These cases will usually be found to be neurotics who lead a sedentary life and who are the subjects of lithemia and auto-intoxication. The ophthalmic surgeon should be called in to remove any irregularities of the respiratory passages. Where chronic bronchitis exists between "seasons," this condition should be carefully overcome. The most satisfactory results, however, are obtained by the removal of the patient from the presence of the irritating causes of the trouble.

Emphysema.

Vesicular emphysema is a dilatation of or increase in the size of the lung vesicles, characterized by an enlargement or distension of the lung, difficulty of breathing, enlargement of the thorax, and oftentimes dilatation of the heart. It is a chronic disease that rarely proves fatal, but which gives the sufferer considerable discomfort, largely due to the associated asthmatic attacks and continued difficulty of breathing. Its principle danger is the cardiac changes that take place, and in the treatment of emphysema we should take these into consideration. Intercurrent attacks of pneumonia demand treatment and careful attention along the lines laid down for that disease. One aim should be the reconstruction of the general health as a necessary basis and the treatment of the emphysematous condition. These cases should be gradually trained to stand tonic hydrotherapeutic procedures. Commence the treatment with the electric light bath or hot blanket pack until perspiration commences, following this with the cold sponge at 70° F., rapidly performed. After two or three days of this treatment we may substitute the dripping sheet at 70° for three minutes, with vigorous friction, taking care to have the patient stand in a hot foot-bath at 110° to 115° F. during its application. As soon as satisfactory reaction has been secured we may adopt these measures: The daily use of the electric light or hot-air bath to perspiration; follow this by the horizontal or circular rain bath at 100° to 104° F. for one and one-half minutes; reduce the temperature to 70° F. for one-fourth minute, twenty pounds pressure; reduce temperature one degree daily to 60° F. and increase pressure one pound daily until thirty is registered. When these temperatures are reached add to the treatment the alternate or Scottish douche to the spine. The hot water in this treatment should range from 105° to 110°, the cold water 60° F. Give the hot water for ten to fifteen seconds, the cold five to ten; three alternations are sufficient. The alternate or Scottish douche has a direct influence upon the emphysematous condition in the lung, and is a very valuable method of reaching this disease. Where there is weakness or irregularity in heart action we may apply twice daily the precordial compress, over which the ice-

bag is placed. Apply these latter measures morning and night and the hydriatic measures in the middle of the day.

Strasser suggests the use of the trunk compress, half pack at 60° F. for thirty to sixty minutes, followed by the half bath at 50° to 60° F. Where dilatation of the heart exists the carbon dioxide bath and method of resistive exercise, as carried out under the Schott system of treatment, will prove a valuable addition in the treatment of this complication.

Tuberculosis.

Under this heading all forms of tuberculosis are considered, it being left to the practitioner to individualize a trifle in the treatment of certain conditions peculiar to the different tuberculous processes. Tuberculosis is an infectious disease, affecting man and animal. It is incited by the bacillus tuberculosis in such cases where, by heredity, environment or other means, the tissues are devitalized. It is characterized by an exudative and productive inflammation, in which necrosis of the affected tissues is observed. Morphologically, the tissue reaction consists of small nodular bodies—tubercles.

Prophylaxis.—For the tuberculous disease to manifest itself in a living organism two things are necessary—presence of the bacillus and a condition suitable to its development. The first aim, therefore, should be the destruction of the germ and the prevention of an infection. As long as the sputum remains in the liquid state there is less danger from it, but matter expectorated on the floor, in the street or in a handkerchief usually dries very rapidly, and, becoming pulverized, finds its way, by inhalation, into the respiratory tract. To this end the pocket-flask, when properly and faithfully used by the tuberculous, proves an immediate factor in the prevention of this disease. They should be most thoroughly cleansed by placing the flask, contents and all, in boiling water to which some bicarbonate of soda has been added, where they are left for five or ten minutes. This will destroy tubercle bacilli most certainly. The pleasant but unsanitary habit of kissing sick people has often led to the transmission of the disease from one member of the family to another; the habit of kissing domestic pet animals is equally dangerous. Pathologists handling fresh tuberculous specimens, physicians performing autopsies and students dissecting, are exposed to the danger of tuberculosis. To walk and breathe the atmosphere behind a woman dragging her dress over dusty, dirty sidewalks, often dotted with deposits of buccal, bronchial and pulmonary secretions containing various pathogenic microbes, at other times mixed with tobacco juice, must be dangerous to the health of every one. Tuberculously predisposed individuals should be instructed that they may become strong and healthy, and that the accidental inhalation of tubercle bacilli will not be sufficient to produce



PLATE 123—Tent Village, Fort Stanton, N. M. (Carrington)

consumption. Those in fair health, living a regular and hygienic life, have little to fear. It is the anemic, dyspeptic, toxemic individual, of low vitality that makes a candidate for tubercular disease. Every effort should be made to secure good appetite and the digestion of plenty of simple and wholesome food. Fresh air, sunlight and out-of-door exercise are valuable. Alcohol in any of its forms should never be used. Resort to the use of cold water, with its stimulating, invigorating and tonic properties, is one of the best known prophylactic measures in existence. It certainly develops vigorous action of the vasomotor system, prevents congestion and catarrh, and gives a robustness not alone against the tubercular, but any infection. It can be instituted at an early age. A child a few months old can support with impunity, after the use of its warm cleansing bath, a rapid sponging off with cold water, followed by a relatively vigorous friction with a soft towel. As growth takes place he should not only be taught the use of the cold water after his semi-weekly bath, but each morning should bathe the face, neck and chest, "down to the waist," with cold water. If access can be had to swimming baths, showers or sprays, they should be utilized, winter and summer alike. It is my candid opinion that anemic, dyspeptic and toxemic individuals who are candidates for consumption can, through a graduated course of tonic hydrotherapy, prevent its inception; in fact, it is with them almost a specific. *I have yet to see the individual who could not, by a judicious training, be brought to bear vigorous methods; all that is necessary is to secure reaction and a gradual education of the skin and nervous system.* If necessary, start with the cold sponge rapidly performed, best by the patients themselves, then the affusion, and last the douche. Always follow these methods with friction by the hand and afterward with a coarse towel, and what will be said with reference to air and sunlight in the treatment of developed tuberculosis applies to these individuals. We should always bear in mind what Loomis has said upon the question of inheritance: "My experience has led me to believe that tuberculous heredity has very little to do with the question of a person's recovery, all other things being equal. Of twenty persons known to me who have recovered from phthisis during the past year alone, nine have pronounced tuberculous histories. One had two brothers and one sister to die of phthisis."

The successful treatment of tuberculosis may be conducted in all climates. Care must be taken to prevent self-infection by swallowing the sputum, and to prevent infecting others by expectorating only in pocket-flasks, never indiscriminately. The bed-clothing, knives, forks, dishes, and other tableware used by consumptives, must be carefully sterilized. The sleeping apartment should be ample and the patient must always sleep alone. The bed should be set with the head against an inside wall; the mattress must be hard, and never feathered; the

room well ventilated and kept open most of the time. At night the patient should sleep with the window open, rain or shine, cold or warm, foggy or clear, wide open in summer, half-open in winter.

There should never be any fear of night air, for in cities it is really purer than in the day time. The room should contain no carpets or hangings.

As much time as possible should be spent in the open air, as far as possible at rest, protected from the wind, keeping the body constantly in the sunshine. At Falkenstein patients stay out seven to ten hours daily in chairs, despite rain, fog, wind, snow, and the thermometer below zero. While resting in the chair patients may read or write, but should endeavor to secure perfect muscular relaxation, for by so doing they favor strength and reduce fever. Their lower limbs should be covered with lap robes or blankets. As they gain strength short walks may be taken, or the patient rise every hour for a short breathing exercise. The dress is negligée and comfortable: the underwear light, woolen union suit; the shirt negligée, the cap ventilated, shoes thick-soled and rubber heeled. Women must wear short skirts that do not touch the ground, should follow the Lady Huberton, Miller style. The divided skirt as an outer dress is often advisable. All clothes should be hung from the shoulder; never constrict the waist nor interfere with abdominal breathing; corsets are to be avoided, but if used must be light, or, what is preferable, a waist. Never constrict the neck or wear tight shoes; heavy soles, rubber heels for ordinary wear, with gum shoes in cold weather. Men should not be permitted to smoke or chew tobacco.

The diet should be a nourishing one, and the patient really overfed. All the food that *can be assimilated*—that is to say, a mixed diet of proteids, carbohydrates and fats—for the digestive power often far exceeds the appetite and eating capacity of the patient. Frequent feeding has been suggested: Breakfast 7 to 7:30, to consist of bread, butter, honey, cocoa or chocolate and two or three glasses of milk; 10 A.M., bread, butter, cold meats, fruits, etc.; 1 P.M., soups, fish, meat, vegetables, salads, preserves, dessert, fresh fruit, and, if necessary, a glass of wine; 4 P.M., milk, bread, butter; 7 to 7:30 P.M., soup, potatoes, rice, cold meat, bread, butter, salad, cooked fruit, two glasses of milk; 9 P.M., two glasses of milk, and, if necessary, a "pony" of cognac. The large use of milk may be made digestible by the use of five grains of bicarbonate of soda and five grains salt. Certain prepared foods may be added to the above dietary, viz., kumyss, plasmon, tropon, etc.

Hydrotherapy in its action is essentially tonic, and this is what the tuberculous person needs. Its aim should be the training of the cutaneous and nervous systems to stand low temperatures, followed by vigorous and prompt reaction. To accomplish this the treatment



Plate 124—"Easy Street," Fort Stanton, N. M. (Excavation)

must be adapted to the individual, and his system gradually educated to stand the treatment. It has been the observation of Dettweiler, Knopf and other noted therapeutists in this line, that this agent possesses a power for good that is almost incalculable. Its action is to produce a stimulation of the sensory nerves in the skin, which is transmitted to the sensory nervous system, invigorating it and every function dependent upon it. The respiration is deepened, nutritive processes increased, circulation made more active, appetite and digestion bettered, and nerve tone strengthened. Another important consideration is the "toughening" the skin receives from the application of cold water, as a result of which the neuro-vascular structures are stimulated and are enabled to adapt themselves to varying conditions of temperature, with the result that the patient does not "take cold."

It has been the writer's plan to commence the treatment with the use of dry friction with a coarse towel, once or twice a day—that is to say, on arising and retiring. This is followed by the use of massage and mechanical vibration. By these preliminary measures we have enhanced the reactive capacity of the patient. All hydriatic treatment must be given in a warm room. These cases will do better where the treatment is preceded by some heating method. In the home we may employ the dry full pack, full hot bath at 102° F., or the "home" hot-air cabinet until perspiration becomes barely perceptible, followed by a rapid general sponge, commencing at 90° F., reducing two degrees daily to 70° F. and one degree daily to 60° F. This is best performed in a warm bath-room by the patient himself. Care must be taken to prepare the cold water in a bucket beside the tub before the bath is entered. "Rub down" with a crash towel till all aglow—that is, securing good reaction. This may be used on arising or in the forenoon, and at night a stimulating chest compress applied, commencing at 80° F. and reducing two degrees daily to 60° F. This is to be worn all night. Where a "shower" can be attached to the bath-tub it will be found of signal benefit, and should be substituted for the sponge as soon as a temperature of 70° F. is reached. If the chest compress is not worn it is an excellent plan to rapidly sponge the chest and upper trunk with water at 60° just before retiring. To increase appetite apply the ice-bag to the epigastric region for half an hour prior to the three principal meals. Where much disturbed by cough the sipping of hot water relieves. In the institutional management of these cases we may select the hot air, vapor, or incandescent electric light bath, which latter I much prefer. It should be administerd for a short period and stopped at the commencement of perspiration; under no circumstances should profuse perspiration be induced. As soon as the patient is sufficiently warmed he is removed from the electric light bath and given a preliminary treatment

(rain bath or douche) of warm water, followed by the cold treatment. Commence with the sponge at 80° F., rapidly reducing two to three degrees F. daily to 65° F., paying especial attention to the apices and spine, followed by vigorous friction and good reaction. Next move to the circular needle rain bath at 100° F. for one minute, reduced to 65° F. for ten to fifteen seconds. Now institute the *full* daily treatment as follows: Electric light bath till perspiration commences; circular needle rain bath at 100° F. for one minute; fan douche, 65° F., to entire body ten seconds; jet douche to legs, spine and apices, front and rear, ten seconds. During the application of the cold water it is a good plan to have the mouth open wide in order that deep respirations may be taken, and to move the arms, legs and chest, as this will reduce the shock of the impact of cold water and favor reaction. The treatment should be finished with good friction in a warm room, first with the hand and afterward with a Turkish towel. Knopf suggests using the douche first on the feet, rapidly passing up to the hips, and spray over the body. I have found this an excellent plan, and usually finish the treatment, where the patients are able to stand it, with the jet to the apices and up and down the spine. The patients should be frequently weighed, a gain in weight indicating success and loss a failure to adapt hydriatic methods to the case. The best time for the bath is the morning hours, and each treatment should be followed by a lunch. In some cases I have found it advisable, when their reaction is well developed, to follow the electric light bath directly by the cold water treatment, better response being thus obtained. A chilly sensation after the bath should indicate a change in temperature and duration.

Baruch,[1] in speaking of the forlorn cases that come to the Montefiore Home for chronic invalids, says that he has been led to adopt the following course, because the skins of many of these poor people have long been strangers to cold water, or, indeed, water of any kind:

"After the thorough cleansing with a warm bath or soap ablution, a day is allowed to elapse. The patient is now wrapped snugly, quite naked, in a woolen blanket, so that his body is excluded from the air; other blankets are piled over him, the windows are opened and he is given a small glass of iced water every ten minutes. Having lain in this position an hour, a part of the body is exposed and bathed, as follows: With a towel the face is bathed in water at 50° F.; a basin of water at 75° F. is made ready, into which the attendant dips his right hand, covered by a mitten or glove of Turkish toweling. One arm having been exposed, it is rapidly washed and rubbed with the wet glove dipped in water at 75° F., then dried and replaced under the blanket. Other parts are successively treated. At the termination of this ablution the patient is rapidly rubbed with a coarse towel. This treatment is repeated daily, the temperature of the water being reduced two degrees on each occasion until 60° is reached. The

1 Baruch, Simon: "Hydrotherapy," 1900, p. 311.



PLATE 125—A Row of Six Tent Houses, Fort Stanton, N. M. (Carrington).

dripping sheet is now indicated. The result is usually an improved appetite, better digestion and assimilation, improved hematosis, deepened respiration, vigorous circulation—in brief, an enhancement of all those functions which contribute to the maintenance of health and on whose integrity depends the prolongation of life."

Morris[8] says that a certain number of cases fail to respond to treatment because of the heart weakness present. Upon examination they will be found to have a dilated heart, high pulse-rate and temperature. In these cases a valuable adjunct to the general management of cases is the Nauheim bath, applied as though we were treating the cardiac condition alone. His results were excellent. The dilatation lessened, pulse-rate and temperature declined and arterial tension rose. In two cases, in the incipient stage, the author has himself seen the cardiac condition clear up and the pulmonary lesion improve. Subsequent treatment "cured" the cases.

Certain symptoms prominent in the disease can be treated satisfactorily by hydriatic methods. Tuberculous pyrexia demands special management—absolute rest in bed, in a well-ventilated room, with as much fresh air as possible; internal administration of cold water, lemonade or orangeade. The rule should be that the higher the temperature the more tepid the water. We should start with a partial and then an entire cold sponge. Winternitz[9] suggests water at 65° to 55° F., sponging the parts in the order named: Hands, forearms, face, throat, neck, arm-pits, back, stomach and lower extremities. The parts should be exposed as little to the air as possible, should be sponged and dried rapidly; repeat three to four times daily. We may next proceed to the use of the cold compress or a partial pack, applying first to the legs and then to the arms, or alternating every hour. Where there is the slightest tendency to cardiac collapse the ice-bag should be applied to the precordia. The cold enema oftentimes reduces temperature nicely.

Cough and night-sweats are best prevented by rest, sleeping in a cool room, with plenty of fresh air, light bed-clothes and the wearing of no underwear in bed. The chest compress is the best method, being careful to cover the apices thoroughly, using water at a temperature of 55° F., the compress being covered by a flannel compress and remaining on all night. In the morning remove the compress and quickly sponge the chest with water at 60° F., followed by friction. This same treatment will help to overcome the insomnia and restlessness often found in these cases.

Climate alone will never cure phthisis, and as the vast majority are among those who cannot afford trips and long sojourns, it stands

8 Morris, Geo. H.—American Medicine, February, 1902.

9 Winternitz, Wm.—"Hydrotherapy." Gibert's system of Physiological Therapeutics. Vol. IX, 1902.

to reason they must follow out a strict and rigid treatment and discipline, no matter where they may be. I have seen "lungers" on the Riviere, at Monte Carlo, Nice, and other Mediterranean resorts, smoking, gambling and living unhygienically under the fatuous belief that climate would effect a cure. It is certainly a comforting doctrine and reassuring to those who cannot get away, that the tuberculous patient, of whatever country or race, can be suitably treated not far from his own home.

Education and discipline are paramount factors in the treatment. The tuberculous may aid in their recovery by practicing breathing exercises, and by changing their underwear if they perspire much. He should never leave the house before sunrise and remain in-doors during sunset; retire very early, never read in bed, and secure nine hours' sleep if possible. Cheerfulness and happiness, with a willingness to follow out all that science has learned with regard to what is good for his disease, will enable him to make a recovery which otherwise would be impossible.

Summed up in a nutshell, the ideal treatment of the tuberculous patient consists in having him live in a high, elevated and dry climate, residing in a tent or tent-house, within easy access of a central institution, where he may obtain proper and nutritious diet and hydrotherapeutic treatment, with facilities for pleasant rides and drives, unexciting games and such companionship with books and friends as will prevent too great intrusion of ennui and self.

The influence of hydrotherapy is to stimulate, in an unparalleled manner, nervous function, to relieve congestion and develop a neurovascular power equalled only by active muscular exercise. It deepens respiration, increases the oxygenating power of the blood, favors the elimination of carbon dioxide and other waste materials. It increases appetite and digestion, and as a result more food is taken and assimilated, and thus a gain in flesh is possible, while at the same time reparative factors are removing the diseased process and making good the damage already done, for by means of increased circulation, by nerve action and increased oxygenation, waste products are destroyed and more rapidly removed from the system. Every gland in the body is stimulated, and by this means better and more active glandular products produced. Its energizing influence upon the heart and blood-vessels causes an increase of blood circulation, the removal of stasis, congestion and inflammation, wherever they may be; this I have seen time and again in all classes of patients. It checks night-sweats, reduces cough, favors expectoration and relieves temperature. It will thus be readily seen that it sets in action the entire tissues and structures of the patient that are essential to the maintenance of health and physical integrity.

Prevention of Acute and Chronic Respiratory Inflammations.

The basic treatment in the prevention of these inflammations, or, in fact, any other form of inflammatory disturbances of the human system, is to gradually train the cutaneous blood-vessels to stand varying changes in temperature and moisture, and this is largely a matter of training the cutaneous nervous system to withstand impressions that would otherwise markedly influence the vasomotor centers. Nearly all those who are unusually susceptible to those influences that produce inflammation are the subjects of lowered vital resistance and live under vitiating influences. For this reason we should use every means that will improve the general nutrition, especially keeping in mind that the digestion and elimination are two factors never to be lost sight of. Moderate eating, the free use of fruits, the drinking largely of plain or carbonated water, the regulation of constipation and the insistence upon normal nose-breathing are essentials. Nothing in the range of medicine equals cold water as a preventive measure. Where individuals have no access to institutional treatment we may insist upon their using cold water twice daily. In the morning the rapid cold sponge at 60° F. over the entire body, or the cold shower at 60° F. for ten to fifteen seconds, followed by a brisk rub down with a rough Turkish towel, together with the use of a few free hand exercises, will be found a most satisfactory measure. In the afternoon or evening, if he can secure a swimming bath, it will be found most advantageous, but where this is not possible the same treatment may be again repeated in the evening. In large cities the Turkish bath may be used in conjunction with the bath treatment once weekly.

Institutions and sanatoria find the electric light bath to the point of perspiration, followed by certain tonic hydriatic measures, the most satisfactory. Commence with the electric light bath until free perspiration takes place, followed by the horizontal rain bath at 102° F. for one and one-half minutes, reduced to 70° F. for one-fourth to one-half minute, twenty pounds pressure. Reduce temperature one to two degrees daily until 60° F. is reached and increase pressure two pounds until thirty is registered; follow by the cold foot-bath, 60° to 50° F., for one-fourth to one-half minute. As soon as the patient is able the following roborant measures will be found most satisfactory: Electric light bath to free perspiration; horizontal rain bath at 104° F. for one and one-half minutes, followed by the fan douche to the entire body and jet douche to the spine, each one-fourth minute at 60° F., thirty pounds pressure; cold foot-bath at 50° F. one-fourth minute.

Pleuritis.

Pleurisy, or "stitch in the side," is an inflammation of the pleura characterized by a sharp pain in the side, dry cough, dyspnea and

fever. It may be acute or chronic, local or general, and involve one or both sides. It most frequently occurs secondarily to other diseases. Local conditions occur from localized influences such as trauma or local diseases. The disease usually terminates in recovery, though this, of course, depends upon the causal influences that exist. Hydrotherapy is one of the most valuable treatments that can be used in connection with this affection, and the success that it has attained in the hands of experts can be duplicated by the general practitioner if he exercise a little patience and ingenuity. In the treatment of this affection the patient, of course, should be put to bed and kept there. The diet should be restricted to liquids and water drunk freely. It is an excellent plan to commence the treatment with a good-sized dose of calomel, followed by a saline, though this should not delay the immediate application of hydrotherapeutic measures. Broad strips of adhesive plaster are applied to the affected side to secure, as far as possible, physiological rest, and where this is necessary it may be applied and hydrotherapeutic measures used over the strips. During the earlier stages of the disease begin the treatment with the application of a fomentation at 120° to 150° F. for ten minutes to the affected side or spot beneath which the friction murmur is heard. As soon as this is removed apply the stimulating chest compress at 65° to 60° F., seeing that the bandage over the compress is drawn very tight. This should remain in position for one or two hours, depending upon the case, when it can be removed and the entire step of fomentation and compress repeated. It is often an excellent plan to place over the compress a broad flat ice-bag or Leiter coil through which is passed water at a temperature of from 60° to 50° F. The chest compress and ice-bag exert an antiphlogistic effect, relieve pain and prevent exudation. Oftentimes good can be accomplished by the application of the full wet pack at 70° F. for one to two hours, followed by the half bath at 65° F., accompanied by friction. When exudation takes place we may continue the same treatment as recommended during the dry stage, although it will be found especially valuable at this time to use the full wet pack of one or two hours' duration. During the stage of absorption it becomes necessary to remove the serous exudate and build up the general health. Where this exudate is large it is probably best to aspirate same and follow with the treatment hereinafter suggested.

We may commence with the daily use of the electric light bath or hot-air bath to the point of perspiration, followed by the dripping sheet at 70° F. for three minutes, with vigorous friction, reducing water two degrees daily until 60° F. is reached. This treatment may be supplemented by the use of the stimulating chest pack at 65° F., tightly applied and repeated every three hours. As soon as reactive and other capacities of the patient justify we may institute the

following: Electric light bath or hot-air bath to the point of moderate perspiration; follow this with the horizontal or circular rain bath at 100° to 105° F. for two minutes, reduced to 70° F. for one-half minute, pressure twenty pounds. Decrease temperature two degrees daily until 60° F. is reached and increase pressure two pounds daily until thirty is registered.

In chronic pleurisy we may have recourse to the following treatment, that has proven in a number of instances most satisfactory to the author: Electric light bath until free perspiration; circular rain bath at 105° F. for one and one-half minutes, reduced to 60° F. for one-fourth minute, pressure thirty pounds. This should be followed by the Scottish jet or fan douche to the affected side, the hot water at a temperature of 105° to 110° F. for one-half minute, cold from 70° to 60° F. for ten to fifteen seconds. The number of alternations should range from two to five. Judgment must be exercised in the use of the Scottish douche to the chest, and it is best in these cases to commence with the fan douche under very moderate pressure—ten to fifteen pounds—and by gradually accustoming the patient to the percussory influence of the douche reach the stimulating measure of the jet—under twenty to twenty-five pounds pressure.

In connection with the treatment of chronic pleurisy by hydrotherapy much advantage will be gained from the use of those gymnastics that have for their object the expansion of the thorax and the activity of the thoracic muscles. The patient should be taught, in addition, to frequently breathe deeply through the nose, retaining the air within the chest so as to stretch the chest wall thoroughly. Associative measures of some value in relieving, promoting absorption and preventing adhesions, will be found in the galvanic current and massage. Should a purulent collection accumulate excision of the rib is the proper procedure, securing free drainage for the pleural sack just as we would for any abscess cavity. Iodide of potassium, quinine and iron are good adjuvants.

CHAPTER XIV.

DISEASES OF THE PERITONEUM AND LIVER; RHEUMATISM; GOUT; DIABETES; OBESITY; RACHITIS.

Peritonitis.

Peritonitis is an inflammation of the peritoneum, characterized by intense pain, tympanites, vomiting, fever and great prostration. Its origin is usually microbic, entrance being gained usually by traumatism within the bowel, although cases have been reported where it has been believed that they have migrated through inflamed intestinal walls. Where ulceration, perforation and rupture take place the inflammation results from the same causes that produce the original disease. The micro-organisms most commonly found are bacillus coli communis, staphylococcus aureus and albus, bacillus pyocyaneus, tubercle bacillus and the gonococcus. This latter germ usually gains entrance into the peritoneum from the Fallopian tubes. The treatment is both medical and surgical, and in the opinion of the author a surgeon should be at once summoned, as the question of operative procedure early in these cases is a factor not to be disputed. The disease compels rest in bed; the diet should be absolutely liquid—albumen-water, thin soups, gruels of arrow root or barley, dry champagne, etc. The patient should be given salines until free catharsis is secured, one to two drachms every two to three hours. Vomiting is best met by the administration of pellets of ice, Vichy water and the like. Tympanites is often overcome by the use of high enemata of warm saline, to which a little turpentine has been added. Where the fever is high the temperature of the enema should be 80° F. Cardiac weakness, which always accompanies the disease, is most satisfactorily combated by the systematic use of the precordial compress over which the ice-bag has been placed, being applied for fifteen to twenty minutes four to five times daily. Hydrotherapy is of some service. A fomentation at 115° to 120° F. for ten minutes may be repeated for the same length of time and followed by the stimulating cold compress at 60° F. for thirty minutes to two hours, with an ice-bag or coil over the region most affected, and will sometimes increase the vital strength of the patient, reduce pain and cause a cessation of vomiting.

The author is constrained to believe, however, that these are

more or less temporizing or adjunct procedures, and that surgical intervention is of the most service in this disease. In the chronic form we have to do with an inflammation that is usually tuberculous, cancerous or syphilitic, and in the management of this most difficult problem we should have recourse to the sections in which these diseases and their treatment are discussed. The dietary in the chronic cases should be most carefully arranged to avoid as far as possible fermentation and the generation of gas. Free water drinking is indicated. We may have recourse to enemata and mild laxatives to overcome any tendency to constipation. Sometimes the fomentation for fifteen to twenty minutes three times daily, followed by the stimulating cold compress well protected, gives some gratifying relief. During the stage of convalescence from peritonitis rest in bed, concentrated diet and the gradual administration of tonic hydrotherapeutic measures, such as the dripping sheet and the horizontal rain bath, may be utilized.

Ascites—Dropsy—Anasarca.

Ascites is a collection of serous fluid in the peritoneal cavity characterized by a distended abdomen, dullness on percussion, fluctuation and difficult breathing. It may collect in small or enormous quantities, the author having seen several cases in which quantities have been removed far in excess of ordinary belief. It usually has back of it a causative condition arising principally in the heart, kidney or liver. Cancer is sometimes its cause, and it may be safely stated that where ascites exists in the presence of a tumor, and blood in any great quantity in the fluid aspirated, points to a diagnosis of this disease. It stands to reason that ascites, being more or less symptomatic, requires a consideration in its treatment of the particular disease that may be the agent causing the condition. To accomplish the disappearance of the fluid, diminish its secretion and stimulate its absorption, water-drinking may prove useful, but its administration must be carried out on the following lines: The free ingestion of *cold* water is allowed and then a period of six or eight hours must intervene before any other fluid is taken. Under this procedure it will be found that the blood becomes more consistent, more impoverished in water, and therefore takes up water from the tissues and abdominal cavity. It is not only true that the administration of water in this way increases the elimination of the liquids of the body, but it also carries with it the solid products of inflammation and the exudates contained in the fluid. Cold water has a direct diuretic effect, and while, generally speaking, water-drinking is not indicated in nephritic cases, even in these its use, as above directed, will be found advantageous. Where it is due directly to cardiac insufficiency the precordial compress, over which a coil of cold water or an ice-bag

has been placed, will materially aid in the removal of the effusion. In this respect the ice-bag has an action analogous to digitalis, raising arterial pressure and stimulating the circulation. Hydrotherapy is of unquestioned value. We may use the hot-air bath, electric light bath, or, what is by far the most satisfactory of all measures, superheated dry hot air applied by means of the body apparatus. The patient should be placed in this apparatus only as far as the arm-pits. The temperature should range from 200° to 300° F., and the treatment from twenty to sixty minutes. During its application the head should be kept cold by means of a wet turban or ice-cap and compress, and the ice-bag placed over the heart. This treatment must be repeated daily. In two cases the author has seen benefit after the second bath. No cold applications are to be made after this treatment until evidence of diminution of the dropsy is present. It is sometimes best to tap the patient and follow the tapping with the treatment here outlined to prevent reformation. Where access cannot be had to the apparatus mentioned, we may employ the wet half pack from the arm-pits down at a temperature of 70° F. for one to two hours, repeated twice daily. The abdominal compress at 65° F., or circular compress to the limbs and swollen parts, will oftentimes prove of considerable value as a means of giving comfort and relief to the patient. The pack and compress may be combined, giving the pack at 65° to 70° F. for an hour, and in the interim applying abdominal and circular compresses at 65° F. to the affected parts. Sometimes friction with a dry cloth alone will stimulate absorption, but in any event it should be utilized after the hydriatic measures suggested. It will usually be found that these treatments result in increased power and diminished work on the part of the organs affected. We find that the heart is invigorated, its systole strengthened, its diastole lengthened, with a better pulse and an increased arterial tension, due to better muscular state in itself and in the arteries.

As convalescence takes place we may in these cases institute carbon dioxide baths or tonic procedures as follows: Hot-air or electric light bath to perspiration, followed by the dripping sheet at 70° F. for three minutes with vigorous friction, reducing the temperature one degree daily until 60° F. is reached. At this time we may institute the electric light bath to free perspiration, followed by the circular or horizontal rain bath at 105° F. for one and one-half minutes, reduced to 70° F. for one-half minute, pressure twenty pounds. Diminish temperature one degree daily until 60° F. is reached and increase pressure one pound daily until thirty is registered. Later we may add to this treatment the Scottish douche at 110° F. for twenty seconds, followed by a temperature of 60° F. for five seconds, three alternations, applied to the lower spine and legs.

Hepatic Congestion.

This condition of so-called "biliousness" is an abnormal fullness or engorgement of the vessels of the liver, characterized by disorder of the digestive functions, sallow color, coated tongue, foul breath and mental torpor. The liver is usually tender to palpation. This condition originates most frequently in the disobedience of those hygenic laws that all should follow, is brought about by errors and excess in eating and drinking, especially where malt or alcoholic liquors are added to the excessive food. Chronic indigestion and habitual constipation are causes that are exceedingly common, and demand consideration at all times by the hydriatist in his management of these cases. The aim should be to overcome the acute attack and prevent its return. During the attack we may administer a pretty good dose of calomel and follow it with a saline, but should the patient remain very much upset a more rapid way of relief is to wash the stomach, removing all fermenting material; also giving a high enema of soap and water. After this much relief will be gained from the application of the fomentation, repeated as frequently as is necessary. It may be confidently stated that where the congestion is not due to organic changes hydrotherapy is a most efficient method for permanent relief. These cases are usually more or less robust, and we may at once commence the administration of full treatment. Give the electric light bath or hot-air bath until free perspiration takes place, following this with the horizontal or circular rain bath at 105° F. for one and one-half minutes, reduced to 70° F. for one-half minute, pressure twenty pounds. Increase pressure one pound daily until thirty is registered. At this time we may place these cases on the following very active treatment: Electric light bath or hot-air bath until free perspiration; circular or horizontal rain bath at 105° F. for one and one-half minutes; fan douche over the liver and abdomen, jet douche to the spine for one-fourth minute each, temperature 70° F. Commence the pressure at fifteen to twenty pounds and gradually increase to thirty; reduce temperature one degree daily until 60° F. is reached. Should constipation be present recourse should be had to the dietary and general measures suggested under that head. In these cases the Turkish bath has won for itself a reputation that is well justfied, and the only regret is that these baths are not more frequently under the charge of intelligent people who could administer them suited to the individual case. Where intelligently and carefully applied the writer can testify to the benefit to be derived from them by sufferers from this condition.

Catarrhal Jaundice.

Icterus is not a disease, but a symptom-complex group, of an acute catarrhal inflammation of the mucous membrane of the bile-ducts, and characterized by gastro-intestinal derangements, fever, mental depression and sallowness of the skin. While these cases are not generally considered obstructive, still they are in all probability more or less so. The patient should at once be put in bed and placed at rest and the diet limited to liquids, of which milk and lime-water, milk, peptonized milk, buttermilk, whey, raw eggs and broths of beef, chicken, etc., are the type. As improvement takes place we may add milk toast, arrow root, boiled rice, oysters, meat jellies, fish, scraped meat, squab, chicken and soft-boiled eggs. Little sugar, fats and starches should be eaten. Free hot-water drinking is essential, and with this we may utilize the Carlsbad water, as suggested by numerous authors, two glasses of which may be drunk at least half to three-quarters of an hour before breakfast. It is of comparatively little value, except for the relief of the intestinal condition. The Rockbridge alum water sometimes acts better. Local treatment to the bowel is oftentimes of great service, especially high enemata of cold water two or three times daily, using about one quart of water at a temperature from 60° to 65° F. Small, very cold, low enemata at 50° F. twice daily, or a small piece of ice introduced into the rectum, are of undoubted value, causing a freer flow of bile and a relief of the inflammatory condition through reflex influence upon the upper intestine and gall-bladder. Where there is much pruritus we may employ the very hot sponge at 110° to 120° F., to the water of which sodium bicarbonate, three drachms to the pint, has been added. Especially valuable in this connection is the neutral bath to which sufficient sodium bicarbonate or potassium carbonate has been added to render it alkaline. Where much pain exists we may apply the very hot fomentation (120° to 130° F.) for ten minutes, immediately repeated for ten minutes and followed by the abdominal compress at 60° F., worn for three hours, at the end of which time we may again repeat the process. As soon as the patient is able to stand tonic measures they should be instituted. Commence with the dripping sheet at 70° F. for three minutes, with vigorous friction, followed by the cold sitz bath at 60° to 65° F. for five to ten minutes. As soon as reactive capacity is established we may commence with the electric light bath or hot-air bath until free perspiration takes place, followed by the dripping sheet at 60° F. and the sitz bath as above described. After a few days' treatment we may then try the following treatment, which has proved very satisfactory in the hands of the author: The electric light bath or hot-air bath until free perspiration takes place, followed by the circular or horizontal rain bath at

105° F. for one minute and a half, this to be followed by the fan douche to the entire body and the jet douche over the liver region. The pressure should be started low—fifteen pounds—and gradually increased daily until twenty-five or even thirty pounds is registered. The fan and jet douche may be commenced at a temperature of 70° F., reduced one degree daily until 60° F. is reached. To this treatment every other day, or, what is more preferable, at some other time during the day, may be added the sitz bath at 60° to 65° F. for five minutes.

Cholelithiasis; Acute Infectious Cholecystitis; Cholangitis.

Biliary calculi, hepatic colic, usually originate from concretions in the gall-bladder or biliary ducts. These stones are formed partly or entirely from the constituents of the bile, and their presence is not recognized until they attempt to pass from the gall-bladder through the common duct into the intestine, the result of which passage is an attack of colic. Bacteria act as causative agents by producing inflammation, and in the case of cholecystitis the origin is strictly bacteric. The stones are brown, spherical, ovoid or polygonal, their particular constituent being cholesterin. They may become a cause of other troubles, such as perforation, suppuration, peritonitis and hepatic abscess. The rule is that uncomplicated cases recover. During the attacks we may apply the very hot fomentation (130° to 140° F.), followed by the very hot compress for twenty to thirty minutes, repeating these as often as necessary to gain relief. Some writers have found the hot full bath, as hot as can be borne, an excellent method by means of which the patient may be relaxed and the pain relieved. An excellent method is the use of the hot trunk compress with the hot-water coil or bag upon the outside to maintain the temperature. The patient may be instructed to drink freely of very hot water. Should this be vomited the drinking must be continued, as it will tend to allay vomiting and stop the pain. During the intervals we may continue the use of free water-drinking and the administration before breakfast of sodium phosphate or Carlsbad water.

The experience, however, of the last two or three years seems to indicate that it is possible to remove calculi in the most difficult cases with comparative safety, provided the patient be not allowed to become too much poisoned by intestinal toxins, the toxins of the bile and those resulting from membranous infection. It may therefore be considered that, given a reasonable certainty of gall-stones, we may employ the knife, as the operation is fairly safe. Operation does not, however, insure against the reformation of gall-stones. It simply removes existing stones, cleanses the ducts, and favors free exit of the bile. For this reason we should, during convalescence, and for

many months after an operation for biliary calculi, place the patient upon treatment that will have for its object the restoration of the general health, the increase of vital resistance, the prevention of stagnation of the bile and better general intestinal conditions. The diet at this time should be such as to avoid farinaceous and fatty foods, at the same time eliminating vinegar, spices, pastry, tea, coffee, alcohol, etc. The correction of sedentary habits should be insisted upon. The three best exercises, in my opinion, are horseback riding, bicycling and bowling. These exercises involve the activity of the abdominal muscles, which by their movement tend to act as a suction-pump in removing the thickened biliary secretions.

Here again we should insist upon the free ingestion of water. Two tumblers of Carlsbad water at 140° to 150° F. before breakfast and free drinking of plain water during the day must be insisted upon. These cases, after operation, are usually much prostrated and need a continuous up-building for long periods of time, and nowhere in the range of therapeutics will be found a better method than hydrotherapy. Commence with the dripping sheet at 80° F. for three minutes, with friction, taking care to have the patient stand in a foot-tub of hot water during its application. Reduce the temperature one degree daily until 70° F. is reached. At this time the patient's reactive capacity will enable us to proceed to the next step,—the electric light bath or hot-air bath to free perspiration, followed by the circular or horizontal rain bath at 105° F. for two minutes, reduced to 70° F. for one minute, pressure twenty pounds. Decrease temperature one degree daily until 60° F. is reached and increase pressure one pound daily until thirty is registered. If any discomfort is felt over the site of the operation have the patient protect the same with the hand. At this stage give the electric light bath or hot air bath until free perspiration, followed by the circular or horizontal rain bath at 105° F. for one and one-half minutes, this in turn to be followed by the fan douche to the entire body and the jet douche to the liver at 70° F. for one-fourth minute each. The pressure in this treatment should be started low—fifteen pounds—and very gradually increased until twenty to twenty-five pounds is registered. The temperature may be reduced one degree daily until 60° F. is reached. Adjunct measures that will be found of distinct value in these cases are the use of massage and the application of the static wave current over the hepatic region. A combination of these measures sometimes produces astonishing results.

Hepatic Cirrhosis.

Cirrhosis of the liver is an inflammation of the connective tissue of that organ, chronic in its progress, producing induration, followed by atrophy of the liver cells, characterized by slight jaundice, ascites

tion, gastro-intestinal catarrh and ascites. The causative factor of the disease is generally the long-continued and daily use of alcohol, although the method of its action upon the liver connective tissue is unknown. It would seem from recent investigations and experience that alcohol, with its disturbing influence upon the stomach and intestine, generates a favorite nidus for toxins. If this be true—and it is now most generally accepted to be true—treatment in the early stage should be very effective in the arrest and prevention of the disease. No claim, of course, can be made for the removal of cirrhotic tissue, but functional activity may be preserved and symptomatic cure obtained. The patient should be instructed to live as much as possible an out-door life, and to exercise along those lines that will most influence the abdominal and trunk muscles. For this reason horseback riding, rowing, bowling and gymnastic movements for the trunk are very valuable. The diet should consist of bouillon, soups, milk, custard, vegetables, such as string beans, peas, potatoes, mashed or baked, lettuce, tomatoes, turnips, spinach, greens, etc. Meats should be eaten in great moderation, the white ones being preferred, especially chicken, squab, turkey, fish, etc. All forms of alcohol, together with spices, teas, coffee, fried food, pastry, etc., should be interdicted. Especial care should be taken to maintain an equable body heat and the avoidance of cold and fatigue. Water may be freely drunk, especially the alkaline and alkaline carbonated waters, Carlsbad water before breakfast, very hot, or some form of saline purgative, is useful. In case of ascites tapping should be done. In this disease the electric light bath seems to exercise a very beneficent action and oftentimes is of surprising benefit. In this respect it resembles the sun bath, with regard to which clinical observations have shown it to be a powerful factor in degenerative conditions in abdominal viscera. The arc light bath, especially where concentrated over the liver, is an excellent method of treatment, and may be combined, if so desired, in simultaneous use with the electric light bath. Commence the treatment with the electric light bath to free perspiration, followed by the rain bath at 105° F. for one and one-half minutes, reduced to 70° F. for one-half minute, pressure twenty pounds. Decrease the temperature one degree daily until 60° F. is reached and increase pressure one pound daily until thirty is registered. This should be followed by the cold sitz bath at 50° to 60° F. for five minutes. As soon as the patient reacts well we may proceed to the following *full* treatment: Electric light bath to free perspiration, followed by the circular or horizontal rain bath at 105° F. for one and one-half minutes, followed by the fan douche to the entire body for one-fourth minute and the jet douche over the liver for one-fourth minute. The fan and jet douche should be commenced under low pressure—ten to fifteen pounds—and daily increased until

twenty or twenty-five pounds is registered. The temperature should start at 70° F. and be reduced one degree daily until 60° F. is reached. There is no question whatsoever that the cold jet douche is one of the most powerful and effective means of stimulating the liver. It increases its circulation and functional activity, but before these effects are noticeable it must reach a point of considerable pressure. In some cases we may advantageously terminate the treatment with the Scottish douche over the liver, especially if any pain is experienced. The temperatures of the Scottish douche should range between 110° F. for thirty seconds and 60° F. for five to ten seconds, alternating three to four times. In cases that are feeble or confined to the bed the fomentation applied over the liver will sometimes give great comfort and relief even in advanced cases. It should be followed by the cold compress.

In this disease the author would again recommend the added use of massage, static sparks over the liver and the galvanic current.

Acute Articular Rheumatism.

Rheumatic fever is a constitutional, migratory disease, characterized by fever, non-suppurative inflammation in and around the joints, acid sweating, and a tendency to inflammation of the endo- and pericardium. The origin of the disease is supposed to be a micro-organism, probably a diplococcus, infectious in character, although the germ has not as yet been successfully isolated and cultivated. There is no question but what exposure to damp, cold, and sudden changes in the atmosphere, especially in those who are of lowered vitality, tend to produce the disease. It is rare in the extremes of infancy and old age. It is essentially an exudative inflammation in synovial membranes and ligamentous tissues. There is an increased quantity of lactic acid present in the system, but the exact relation of this as to cause and effect is unknown. The fever, usually 102° to 104° F., in some cases is raised to 108° to 110° F., constituting the dangerous rheumatic hyperpyrexia, at which time cerebral symptoms of delirium are usually present. It is prone to attack joints on the same side of the body. Rheumatism *per se* is not a dangerous disease, the danger arising from inflammations of the cardiac membranes. There is no tendency on the part of rheumatism toward recovery, and relapses are frequent. The mortality is very low, ranging from 0.3 to 0.5 per cent., recovery being the rule. Treatment should have for its object four purposes: (1) Combat the inflammation, (2) encourage elimination, (3) relieve pain, and (4) prevent cardiac and cerebral complications. These indications are, in my opinion, best met by the combined use of hygiene, hydrotherapy and the salicylates.

The patient should at once be placed in bed at absolute rest. The

garment de nuit must be woolen, and the patient lie as far as possible between blankets and avoid the use of sheets. The bed-clothing should be only sufficient to keep him warm, and should the inflamed joints be excessively tender they may be protected by specially constructed framework. The diet must be absolutely liquid, milk keeping a prominent place, to which may be added Vichy or seltzer waters. The free use of water is to be encouraged, as much as one gallon in the twenty-four hours being taken. With some persons this is difficult, but by flavoring it with orange, lemon, raspberry or other fruit juices, it is easily accomplished. If sweetening is demanded, use saccharine, for all cane sugars and proteid food must be avoided.

After many years' experience in the use of the various forms of salicylic acid, I have practically limited myself to the use of sodium salicylate, aspirin and salophen. These alone, or combined with small doses of strychnia, are prescribed in rapidly increasing doses until the physiological effect is obtained, and which, in my opinion, should be maintained until the subsidence of the disease. Salicylates act a great deal as quinine, and by some are considered an absolute specific. Heat is an essential method of treatment to obtain results in acute articular rheumatism. In private practice, where the practitioner has no access to special apparatus, we may employ the full dry pack. The night garment should be removed, the blankets warmed and the patient enveloped in them, where he is to remain until perspiration takes place. Where we have access to the incandescent light we may use the general application or local electric light bath applied to the inflamed joints. In sanatorium practice there is nothing comparable to the use of superheated dry hot air at temperatures ranging from 200° to 325° F. for the entire body, or 300° to 400° F. for the local application to a single joint. These applications are all absolutely harmless, and fulfil the four indications of combating the inflammation, increasing elimination, relieving the pain and preventing complication. There is no question but what the very great cutaneous activity induced aids in the elimination of the lactic acid and other waste products found in the body. If at the same time the patient is drenched with water internally, we will find that during the application the perspiration is more profuse and elimination through the kidney better. With the dilating of the surface vessels and the profuse perspiration, heat elimination will be favored and temperature lowered. The action of heat, general and local raises the temperature of the blood one or two degrees, and this seems to be the therapeutic factor. It has often seemed to me that it was a true bactericide. The heat certainly favors vascular activity, reduces the local congestion, stimulates metabolism, increases elimination, relieves pain and destroys those

products that are likely to produce complications. It will be noticed by patients that the profuse diaphoresis is promoted without headache, but it is always advisable, in administering the above treatments, to place a cold cloth upon the patient's forehead, unless there is some rheumatic involvement of the scalp. After all treatments of this character, the patient must be removed and wrapped in blankets, where he is to remain for several hours. In the use of a local incandescent electric light bath in bed, whether it be general or local, the bed should be so prepared as to enable the nurse to immediately wrap the patient in blankets upon removing the apparatus, and thus prevent chilling.

Where the general or local superheated dry hot air apparatus has been used, the patient should be placed in bed without removing the Turkish bath-robe, mittens or stockings in which he has been enveloped. As soon as perspiration ceases, the nurse carefully dries the patient with warm towels, avoiding exposure and chilling. Some cases are so sensitive that no attempt should be made to move them, because of the exquisite suffering that is caused by the slightest movement. When none of the above methods are accessible, we may place the patient in the hot full pack and at the same time apply very hot fomentations (160° F.) to the joints. By exercising a little care the pack may be cautiously opened and the fomentation placed upon the joint. As soon as the tenderness in the joints subsides somewhat, we may apply a stimulating compress to them, wring out of a saturated watery solution of common or sea salt at 60° F., and allow same to remain until dry. Some recommend the additional use of oil silk or rubber tissue to prevent rapid evaporation. In an extended practice I have seen this treatment give immediate relief to pain that had been merely stimulated by opiates, which should never, if possible, be administered in these diseases. Prevention of complications is best met by the heating and sweating procedures above mentioned, as they promote the activity of the skin and kidneys and at the same time eliminate the poisons likely to injure heart or brain.

Hyperpyrexia, though a rare complication, may occasionally develop. If there is the slightest tendency toward an increased elevation of temperature above 104.5° to 105° F., or the presence of any nervous symptoms, the cold cephalic compress should be applied to the head, or the cold cephalic coil or ice-cap may be used. If this is not sufficient, apply the hot full pack until perspiration takes place, followed by the cold sponge, exposing only a portion of the body at a time. Should the temperature, however, continue to rise above 104.5° F., we may have recourse to the full bath at 94° F., gradually reduced to 80° F., using friction during its application, and keeping the ice-cap or coil upon the head. No medicines are of any value

in this condition, and the physician should never hesitate, but use the full bath at once if he desires to avoid fatal outcome. In this respect these cases resemble those of insolation. Where the pulse indicates cardiac weakness, or the ear detects threatened complication, it is well to apply the ice-bag to the precordia. I am satisfied that the more frequent use of the ice-bag would prevent these complications. Sufferers from this disease are apt to be left in a most anæmic condition, and in many instances I have seen disagreeable cases of neurasthenia develop, the treatment of which will be found in another section.

Convalescence demands considerable care and thought. Moderate doses of the salicylates, combined with alkalies, should be continued, and at the same time tonics of iron, quinine, strychnine, glycerophosphates, etc., administered. The rheumatic should be gradually and systematically trained until tonic hydriatic measures have been attained. From a practical experience of eighteen years, I feel satisfied that the frequent use of cold water will do more toward protecting these cases from relapse than any other known form of treatment. The tonic measures to be employed should commence with the dripping sheet at 50° F., the temperature gradually reduced until 70° F. is reached. At this time we may employ the superheated dry hot air, the incandescent electric light bath, dry hot air or vapor bath, followed by the rain bath at 102° F. for one and one-half minutes, reduced to 65° F. for ten to fifteen seconds, to which may be later added douches, especially the Scottish douche, to those joints that have been affected, at 110° to 115° F. for twenty to thirty seconds, reduced to 60° F. for five to ten seconds, four or five alternations.

The cardiac complications are best met by the method known as the "Schott system," consisting of the artificial Nauheim baths and graduated exercises.

Chronic Articular Rheumatism.

Chronic articular rheumatism[1] is an afebrile chronic affection, characterized by stiff and painful joints. I mean a disease in which the capsule and ligaments of the joint and tendon sheaths adjacent to the affected articulation are thickened, and in which the principal and conspicuous symptoms are pain and stiffness in movement of the affected joint. These conditions are found mostly after the middle period of life, and in those who engage in the laborious hardships of manual labor, exposed to cold and dampness. They are the people who have creaking and cracking joints due to dryness and roughness of the articular surfaces. This disease is usually compatible with a fair degree of health, although I have seen many sad cases of extreme disturbance result from the affection. The more-

tality is practically nil, and the disease is usually resistant to ordinary remedial measures. It is in this field that hydrotherapy has made some of its most brilliant cures. Most of the patients are unable financially to remove to a climate free from cold and dampness, and for that reason demand treatment at home. They are not benefited by anti-rheumatic remedies or diet, but should be liberally fed on a diet, in my opinion, in which meat is not entirely excluded, but used in moderation. Fats must be liberally administered, and to this end butter, milk, sweet, buttermilk, Russell's emulsion of mixed fats are valuable. Cereals, fruits, vegetables, moderate amounts of sweets and well-cooked bread should constitute the dietary. I rarely ever use anything else except tonics. Hydriatic measures offer an excellent means of combating the disease, and should have for their object the relief of the pain and the increasing of general vital resistance. Home treatment is often of great value. A hot full bath at night, followed by the full dry pack for one hour, will oftentimes mitigate the pain and secure restful sleep. Where this cannot be carried out —and this is frequently the case in private homes—fomentations may be applied to the affected joint. Where this is not accessible, the stimulating compress applied to the affected joint, covered with flannel and oil silk, is oftentimes productive of satisfactory results. Here again we may employ the compress dipped in a saturated watery solution of common or sea salt, at a temperature of 65° F., allowing same to remain on all night.

With institutional facilities nothing is comparable to the use of superheated dry hot air. Where the condition affects a large number of joints it is best to use the full body apparatus, commencing with twenty minutes at 200° F., gradually increasing the time to one hour and the temperature to 300° and 350° F., being careful to keep the head cool by means of the turban, cold compress or ice-cap. Where a single joint or two are affected, the local or small joint apparatus should be used, and the temperature raised to 400° F., same duration. The Turkish bath, Russian bath and hot vapor bath have all been found useful, but in my experience not so valuable as the first-named treatment. Many spas have won their reputation on the treatment of this affection by hot alkaline or other mineral waters, notable among which are the hot springs of Virginia and Arkansas, and Mount Clemens, Mich. In Europe, mud, sand, peat and mineral baths have been used, but none possess any therapeutic value because of the animal or mineral matter contained in the springs. Hydrotherapy must be persistently and thoroughly applied if permanent results are desired. The final aim of this treatment, however, is to train the patient to stand tonic cold procedures, and as soon as the pain is partially relieved graduated cold bathing should be used. To this end we may start with the cold sponge, move to the dripping

sheet, and finally utilize the more active tonic measures of the rain bath and douches. The Scottish douche, in connection with superheated dry hot air, has proven in my hands the most satisfactory of all methods. As soon as the pain begins to subside the patient should be trained to the Scottish douche and encouraged to bear the water very hot (115° F.) for twenty seconds, thirty pounds pressure, and cold (60° to 50° F.) for five seconds, if possible. This he will be able to do, as there are usually no cardiac complications to interfere. *Never use* cold immersion baths (full cold bath, half bath, etc.).

For many years I have alternated this procedure with the use of massage, mechanical vibration and static electricity, giving vigorous massage of the muscular and joint structures, and applying heavy sparks to the affected areas, followed by the use of the static wave current to the affected joints. Exercise in the open air, especially in the sunlight, should be enjoined upon these cases. When recovered they should wear woolen underwear all the year round and avoid strains upon joint and muscular structures.

Muscular Rheumatism.

The so-called muscular rheumatism is, in my opinion, a myositis which may or may not be set up by the rheumatic toxin. It is an affection of the voluntary muscles, characterized by soreness or tenderness to pressure over the affected muscle, stiffness and discomfort or pain on movement. My experience has been that the majority of cases are brought on by exposure to cold, and occur in patients who are the subjects of gastro-intestinal intoxications. I consider the inflammation in its primary stage to be of an exudative and adhesive type, binding together, as it were, the muscular fibers or bundles; later we have a proliferation of interstitial tissue, which results in an infiltration of the muscle and subsequent increase in hardness or density. The most frequent seat is that of the lumbar muscles (*lumbago*), the intercostal muscles (*pleurodynia*), the deltoid and the sterno-mastoid muscle (*torticollis, wryneck*). Careful differential diagnosis should be made, for many cases diagnosed muscular rheumatism or its subdivision are in reality neuralgia, an affection of the vertebræ or some other condition that may occur in the locality affected. In the treatment of this affection superheated dry hot air has probably secured more rapid and brilliant results than any other measure, and its administration as described under "Chronic Articular Rheumatism" is applicable here. Where we have a lumbago or pleurodynia to deal with, or even in cases of wryneck, we will again find that the Scottish douche is a method that nearly always insures prompt success. Where these methods are not accessible, however, the electric light bath to the affected part may be employed for the same purpose. If this cannot be obtained, the fomentation is the

best method to use. The author has stopped the use of liniments and salves.

I consider the after-treatment highly important. If the patient would maintain health he must keep his skin in healthy activity by daily bathing and the constant use of cold water. Where he has access to institutional treatment, the tonic measures suggested in "Chronic Articular Rheumatism" apply here, as do the applications of massage and static electricity. Moderate exercise in the fresh air and generous diet, freedom from alcohol, wines or beer, the avoidance of tobacco, free water-drinking and tonic hydrotherapy are the preventive measures that will insure good health.

Rheumatoid Arthritis.

Arthritis deformans is a chronic progressive and destructive disease of the joints, characterized by deforming changes in the synovial membranes, cartilages and bones, with bony outgrowths which interfere to a greater or less extent with the mobility of the affected articulations. It occurs oftenest in women, and most frequently affects the hands, elbows, neck and knees. Its origin is not well known, though it is supposed to be a trophoneurosis, and we find it frequently brought about by worry, grief, mental shock, overwork and elements that influence the nervous system. In the majority of cases the progress of the disease is arrested, leaving several joints more or less crippled. A few become helpless and bed-ridden, but, as a rule, the milder forms of the disease are not incompatible with fair health and a long life. The treatment should be commenced early, with the object of arresting the disease and preventing destruction of the joints. To this end it is of importance to maintain the general health at its highest point, for it will be found that in proportion to general good health will the disease be slower in progress and prompter in arrest. In this disease the patient should be well fed, with a liberal dietary of meat, eggs, milk, butter, vegetables, and even malt liquors may be advantageously added. Fresh air and moderate exercise are useful adjuncts.

The local treatment of the affected joints embraces the use of superheated dry hot air, local electric light bath, followed by the application of the Scottish douche at 115° F. for the hot and 70° F. for the cold, thirty and five seconds, respectively, three alternations. Where these treatments are not accessible we may employ the stimulating compress at 60°, wet in a saturated solution of common or sea salt, covered with a blanket or oil silk and allowed to remain on several hours, followed by movement of the joint and local massage. My own preference is for superheated dry hot air, and it has yielded me some most excellent results where carefully and persistently applied.

General treatment may embrace the use of the body apparatus for superheated dry hot air for one-half to one hour, followed by the rain bath at 102° F. for one and one-half minutes, reduced to 65° F. for ten seconds, or the Scottish jet douche to the affected joints and spine for thirty seconds at 115° to 120° F., followed by a temperature of 60° F. for ten seconds, pressure twenty to thirty pounds. In the same manner we may employ the incandescent electric light bath instead of the superheated dry hot air. I have tried the Nauheim bath for this condition, but have not found it very serviceable. Most patients do best in these conditions when sent to sanatoria. Dry hot air at a high temperature produces free perspiration and is well borne. The heart is unaffected, the swelling and stiffness of the joints combated, the pain relieved.

As alternating treatment we may use massage, gymnastics and the static wave current. Give the massage first and follow this by static sparks to the spine and the sparks and wave current to the affected joints. I have tried the cataphoresis of mineral substances by the galvanic current to the joints, but have never seen the slightest benefit result. Tonics are always useful in these cases, and sometimes iodide of potassium.

Some springs are valuable in this line—the hot springs of Arkansas and Virginia, Mount Clemens in Michigan, Richfield Springs of New York, Bath in England, Baden, Wiesbaden and Carlsbad in Germany.

Gout.

Podagra is a constitutional disease, usually the result of an inherited fault of nutrition, characterized by acute attacks and a chronic state, with the presence of uric acid in the blood and deposits of urate of sodium in certain joint structures. My observation has been that fermentation in the intestinal tract precedes the acute attacks, and is present most of the time in the chronic form. This condition is usually aggravated by free indulgence in eating. Acute gout is rare in America, though the chronic form is fairly frequent. We probably see more cases of "American" or irregular, commonly denominated lithemia, in this country. Gout is compatible with longevity, although it may possibly shorten life by kidney involvement, frequently being the origin of interstitial nephritis. The essential elements in the treatment and mangement of these cases, both acute and chronic, may be resolved into four distinct categories: (1) Control of dietary; (2) counteraction of auto-intoxication; (3) the favoring of elimination and oxidation of proteid waste material and toxins; and (4) the gradual development of vital resisting capacity.

The diet should consist of varied foods. A moderate amount of proteid food in the form of meat may be allowed once daily.

Those meats that are rich in nucleins, such as brain, liver, kidney, thymus, and which increase uric acid, should be eliminated from the diet. In this category fall rich sauces, pork, veal, salted and smoked meat or fish. One should gradually change from a rich meat diet to the gout one. Fats may be generously used, and in this line, milk, buttermilk, butter, cod-liver oil, sevetol and Russell's emulsion may be employed. Milk is of advantage, as it increases the excretion of xanthin bases and reduces that of uric acid. Cereals of all kinds may be used—oat meal, cracked wheat, "Force," etc.; fruits, both raw and cooked, with no sweetening—raspberries, blueberries, strawberries, apples, oranges, etc. Fresh fish and eggs in moderation. Vegetables are excellent. Peas, string beans, corn, potatoes, turnips, carrots, parsnips, celery, cauliflower, artichokes, salads, cucumbers, egg plant; also bread, rice, sago and tapioca. Vegetables create hippuric and benzoic acids, both of which are solvents of uric acid.

The gouty must avoid alcohol, ales, beer, sweet and heavy wines, pastry, pies, pancakes, rhubarb, tomatoes, radishes, cabbage, sugars, sweetmeats, pickles, tea, coffee and tobacco. Water is to be freely drunk because of its diuretic effect and power to remove the alloxuric bases (uric acid, xanthin); by free use of water I mean the ingestion of at least one gallon per diem. The alkaline waters, especially Vichy, may be used instead of the ordinary plain pure water, but should be as freely drunk. The rule for the gouty is to eat slowly, masticate thoroughly. Simplicity should be observed at meals, thereby avoiding a large variety at one sitting.

In the treatment of the acute attack all food should be immediately shut off and a brisk calomel purge given, alkaline waters ingested, and the wine of colchicum or some preparation containing colchicum administered. Two methods of local hydriatic treatment may be employed—hot or cold. The use of the local superheated dry hot air at a temperature of 400° F. for twenty minutes to one hour will do a great deal to relieve the pain and swelling of the joint. The local electric light bath may likewise be utilized for imparting heat to the affected part. If this is not attainable, a very hot fomentation at 160° F., covered with oil silk, will be found grateful. Some cases, however, prefer the application of the cold compress, repeated as frequently as it may become warm. In this we should be largely governed by the patient's feelings, and care must be taken not to *overdo* treatment during the acute attack. As soon as this subsides, institute the treatment below outlined. To counteract the auto-intoxication of the chronic state we have recourse to the dietary above outlined, to the increased ingestion of water and the employment of certain anti-fermentative medicines, the most satisfactory of which have been, in my hands, guaiacum, zinc or sodium sulpho-carbolate

and potassium permanganate. The last preparation I have made with a coating soluble only in the intestinal secretion.

To encourage tissue changes, elimination and the oxidation of toxins and proteid waste material, we must have recourse to the prolonged use of sweating measures, and to this end we may employ the full dry pack for one to one and one-half hours; the full wet pack for the same length of time; the vapor, Russian, Turkish, electric light, hot air bath or superheated dry hot air. After quite a little experience in the treatment of these conditions I have gradually narrowed the treatment to the following: The patient is placed in the superheated dry hot-air body apparatus, enveloped in Turkish toweling and bath-robe, and submitted to a temperature ranging from 250° to 350° F., and is allowed to remain therein from twenty minutes to one hour, the head being kept cool by a cold compress or an ice-cap. This treatment may be applied daily, or we may alternate with this and the local superheated dry hot-air apparatus applied to the joints affected, at a temperature from 350° to 400° F. for an hour. My experience in the use of this method has not been disappointing, and I have seen tophi and other solid manifestations of gout softened and eliminated. There is no question but what the raising of the blood a degree or two in temperature and increasing the circulation in the skin or in the part affected produce changes incapable of attainment by any medicinal measure.

There is no question of a doubt concerning the efficacy of the stimulating compress applied at 60° F. to the joints affected. The compress should be wrung out "wet," using a saturated watery solution of common or sea salt, applied well covered with flannel, and finally oil silk or rubber tissue. It must remain upon the joint during the night. I have seen some good in subacute attacks from the primary application of heat—a hot foot- or hand-bath, fomentation or compress, followed by the above method of stimulating compress. We may in private homes follow another method: Give a very hot full bath for five or ten minutes, taking care to avoid catching cold, after which the compress is applied to the affected joints. This treatment is best given in acute cases, night and morning; in chronic cases at bedtime.

The aim *after* the above treatment should be to gradually train the patient to stand the tonic hydriatic measures of rain bath and douche, especially the Scottish douche, 115° F. for the hot, 60° F. for the cold thirty and five seconds respectively, four alternations. It has been my observation that by so treating these cases and gradually developing their vital and resisting power through the use of tonic cold methods we not alone preserve the health, but by keeping the system free from the causative factors prevent recurrence

of acute attacks and the deforming and crippling effects of the chronic condition.

From time to time gouty persons should subject themselves to courses of hydrotherapy as above outlined. This is best obtained in some institution or sanatorium, where it may be combined with applications of massage and static electricity. In my hands static sparks to the spine and over the affected joints, followed by the application of the static wave current to the affected parts, in conjunction with massage, hydrotherapy, diet, exercise, gymnastics, tonics and intestinal antiseptics, constitute the rational treatment.

Where we have to deal with retrocedent forms, if they be cerebral, cold should be applied to the head and the hot full bath administered; if gastro-intestinal, the hot abdominal pack, the hot full bath or hot compress.

Lithemia—Uric Acid Diathesis.

Lithemia, irregular or atonic gout, uricemia, or the so-called "uric acid diathesis," is a condition in which the fluids of the body are surcharged with nitrogenized waste in the form of uric acid and other toxic bases, characterized by symptoms of gastro-intestinal indigestion and intoxication, by indefinite muscular and joint pains, and by a host of nervous symptoms and phenomena, all of which are usually associated with a high-colored, scanty urine, in which crystals of urates, uric acid and oxalates are present. The writer does not desire to enter here into a discussion of the relation between these symptoms and "uric acid," but simply believes that this is a state that has been in the past so denominated, but which in the future will probably be shown to be due to other toxic conditions than uric acid. Its origin is usually to be traced to an inherent tendency on the part of the tissue in many cases. In others "high" living, little physical exercise, and sedentary habits, together with the eating of large quantities of proteid material, produce the symptoms. These cases have always seemed to me to bear a close resemblance to a fire with an imperfect draught, and this is borne out by treatment which has for its object increased and more perfect oxidation of tissue. The affection is one in which there is too great input and too little output, for faulty elimination of waste products is followed by a most deleterious influence, especially venting its influence upon the nervous system. My observation has been that in these cases the sphygmomanometer will show a condition of hypertension in the arteries. The pulse is apt to be hard and the second aortic sound accentuated. Failure to remove the condition brings about chronic interstitial nephritis, arteriosclerosis and heart disease.

The first indication for successful treatment is the regulation of the diet. Proteid food, especially those rich in nucleins (brain, liver,

spleen, thymus, etc.) should be immediately cut out and ordinary meats allowed but once daily. By gradually cutting down the quantity they may be eliminated entirely from the bill of fare. Milk, cream, buttermilk, eggs, lettuce, spinach, celery, salads, and moderate use of starchy and saccharine foods, constitute the diet. Fruits are especially valuable, and should be eaten freely, both raw and cooked. The patient must not be allowed to drink tea, coffee, cocoa, or use liquors, wines, beers or tobacco. In these cases I have often found the use of fruit alone at one meal valuable as an antiseptic and eliminant. Exercise, fresh air and the free drinking of plain, alkaline and carbonated waters to the extent of one gallon per diem must be insisted upon. Digestive disturbances are to be corrected according to conditions found after a test meal; constipation met by the use of the abdominal compress worn during the night or the sinusoidal current. Hydrotherapy will do more to cure these cases than any other method of which I know. We must increase the draught and burn up the waste material. For this purpose the full hot bath, 104° to 108° F., if possible; the full wet pack at 65° F. for one hour; the dry full pack for one hour; the vapor bath, hot-air bath, Turkish bath, Russian bath, electric light or superheated dry hot air may be employed. My preference is for the incandescent electric light bath administered until free perspiration takes place, followed by the horizontal rain bath at 102° F. for one to two minutes, reduced to 70° F. for one-fourth minute, thirty pounds pressure, reducing the temperature one degree daily to 60° F. Later follow this by the jet douche to the spine and legs at 65° F. for one-fourth minute.

No matter which method is employed, it should be followed by a tonic cold procedure of brief duration, commencing with a mild application such as the cold sponge rapidly administered and moving to the dripping sheet, rain bath and douche. The action of this method is to increase the alkalinity of the blood, powerfully stimulate oxidation, favor elimination and destruction of toxic material in the blood. This is materially aided by the internal use of water and the restricted diet. Care must be exercised not to overdo the treatment with these patients. In sanatoria we can advantageously combine with the hydrotherapy, massage, both manual and mechanical; vibration, faradic and static electricity. I have found medicines of little practical curative value in this trouble. The salicylates, colchicum and alkalies may be tried.

Diabetes Mellitus.

Diabetes mellitus is a chronic affection characterized by the constant presence of grape sugar in the urine and excessive urinary discharge, with progressive loss of flesh and strength. Most commonly observed in males, its origin seems to rise from some peculiar

disturbance of the nervous system, and possibly from the excessive use of farinaceous foods and malt liquors. The majority of cases ultimately prove fatal from gradual exhaustion or profuse blood poison, ending in diabetic coma. Amelioration of the symptoms occurs and the progress of the disease may be greatly retarded, life being prolonged for many years, although complete recovery rarely occurs.

The treatment resolves itself into a regulation of the diet, the establishment of hygienic laws, exercise and the use of hydrotherapy. The diet should contain a minimum quantity of starch and sugars, and yet be as rich as possible in fats. The absence of carbohydrates increases the tissue burning, especially that of the muscles; reduces the disagreeable symptoms, and, to a certain extent, prevents complications. The diet found most satisfactory must be monotonous and consist of the *muscular parts* of the ox, calf, sheep, pig, deer, game, all to be eaten with their gravies; also fish and sardines. German sausage, mackerel, smoked ox tongue, cream cheese, breakfast bacon, butter, salad with mayonnaise and cream furnish the largest quantity of the food. Among the vegetables, spinach, celery, lettuce, cabbage, tomatoes, asparagus, olives, cucumbers, sauerkraut, brussels sprouts, onions, water cresses, all kinds of nuts, apples, lemons, strawberries, etc., may be used. Van Noorden's and Crofton's diet tables will be found of great help in this disease.

Diabetics may live a long time in comfort provided they will submit to the intelligent control of the physician. Even when they are doing well they should be submitted to courses of treatment three or four times a year, during which time they are subjected to a close restriction of diet and the use of the measures herein suggested. As long as possible the occupation should be continued.

Exercise is of great advantage to the diabetic. It is best taken in the morning, and may consist of walking, hill-climbing, horseback riding, rowing, bicycling or golfing; this latter, the writer believes, is the most satisfactory. Where the individual is incapable of muscular exercise much benefit can be obtained by the use of "resistive exercise" administered immediately after the various hydrotherapeutic methods to be hereinafter indicated. The author has found it very satisfactory to combine the use of massage and mechanical vibration with exercise, but this must not be used as a substitute for exercises in the open air, as it has a tendency to destroy the patient's self-reliance and activity, a condition that is present and which must be combated.

Hydrotherapy is one of the most satisfactory of measures that can be employed in these diseases, but as diabetics do not always stand hydrotherapy well, at the start they must be carefully studied and trained to treatment. Cold tonic hydriatic measures are the aim, the best results being obtained when the full effect of the douches

are reached. The basis of all successes in the use of water with diabetics is the question of reaction, which must be carefully watched. I may say, in passing, that chemical and medicinal baths found at springs or medicated at home possess no value over the plain and simple bath. Baths containing peat, mud and other similar substances are absolutely detrimental to the diabetic, and tend to produce irritation and inflammation of the skin, one of the dangers of the disease. The influence of the treatment when fully established is that of a tonic roborant, with an increase of the circulation and good feeling of the patient. This psychic effect, brought about by the thousands of sensory impressions travelling through the skin to the brain, is of great value in increasing "the fighting power" of the patient, and should not be forgotten. We can commence the treatment by the use of the hot pack until the skin is warm and the cutaneous blood-vessels dilated. This should be followed by a rapid cold sponge at a temperature of 60° F. As soon as the patient responds substitute for the cold sponge the wet sheet rub at 75° F., lowering the temperature two degrees until 60° F. is reached. Now institute the electric light bath, hot air or superheated dry hot air to the point of perspiration, then apply the circular rain bath at 104° F. for two minutes, reduced to 90° F. for half minute; lower the temperature of the cold water until 60° F. is reached, increasing the pressure. By this time reaction will have been well established and we may proceed with the full treatment. The author prefers the electric light bath continued until the patient perspires; he is then removed to the rain bath at 104° F. for two minutes, reduced to 90° F. for fifteen seconds; this is followed by the jet douche to the spine and lower limbs and fan douche to the body at a temperature of 80° F. for one-half to one minute. These temperatures should all be gradually reduced one or two degrees daily until 60° F. or even 50° F. is reached. The pressure should range between fifteen pounds at the start to thirty at the termination.

Crofton[1] called attention to the fact that the glycolytic or sugar-destroying ferment was increased by cold water applications, due doubtless to the increased leucocytosis that follows the bath, as these cellular bodies are carriers of the ferment; in this way the sugar is more rapidly destroyed, sometimes as much as 50 per cent. in a few days. In addition, as we have heretofore shown in the earlier pages of this work, the alkalinity of the blood is increased as well as its oxidative power, hence a diminution of the usual acidosis and a destruction of toxins usually present. There is no question but what this treatment is followed by an increased absorption of oxygen, better elimination of carbon dioxide, and as a result an increased oxidation of sugar, due to better activity of the muscular structures

1. Crofton, A. C., Medicine, January, 1904.

through the use of the douche. The author, as above stated, in many cases prefers the use of resistive exercise immediately after the bath.

Among the most distressing of all the symptoms from which the diabetic suffers is pruritus. The itching at times drives the patient to scratching the skin, as a result of which we often find infection, boils, acne, etc. It interferes with sleep and leaves the sufferer weak and exhausted. Nothing in my hands has given such satisfaction as the neutral bath applied at bedtime for one-half to one hour, relieving the itch and inducing sleep. The genitalia should be bathed carefully twice daily and dressed with zinc stearate. Some authors have found the carbon dioxide bath of benefit, but this has not been the writer's experience. During the interims of treatment swimming will be found an excellent measure, as it combines the thermic effect of the water with exercise, especially one that increases respiratory action.

Diabetes Insipidus.

Polyuria is an affection characterized by the continued excessive secretion of a very large quantity of pale, watery urine, free from albumin and sugar. It has its origin most frequently in diseases of the nervous system, especially hysteria, injuries, tumors, etc., although malaria and syphilis may produce the condition. It seems to consist of a dilatation of the renal vessels, the result of improper innervation. The quantity of urine passed is sometimes enormous, ranging from one to five gallons in the twenty-four hours. The author has seen two and one-half gallons passed in a case of fracture of the skull, which recovered. While the prognosis is rather unfavorable to a radical cure, the patient may be kept in excellent condition by avoiding intercurrent maladies. The best treatment for the trouble has been found to be a regulation of the diet, plenty of fresh air, the wearing of flannels and the application of the various measures suggested under the head of diabetes mellitus. This exception should, however, be made, that the temperature should not be given lower than 60° F. I have seen good come from this character of treatment alone. Hydrotherapy is aided by the use of the bromides and ergot.

Obesity.

Adipositas is a disease of nutrition, characterized by the deposition of an excessive amount of fat in many parts of the body. The amount of fat in a healthy adult is about one-twentieth of the body weight, and the possession of a considerable amount of this tissue is a valuable asset in health. It represents a reserve capital to be drawn on in time of need, thus diminishing drain on tissue proteids. In many cases there is an hereditary tendency, this tendency probably being an abnormally low power of fatty oxidation. It is more frequent in women, is found in those who over-eat and over-drink, and

is usually accompanied by anemia. This anomaly is probably explained by the diminished oxidizing power of the blood brought about by the loss of hemoglobin, which is the oxygen-carrier. Treatment has for its aim to check the formation of fat and rid the body of its accumulations. Cases may be roughly divided into two classes, those that exhibit no heart symptoms and those that have heart symptoms. The diet must be regulated, must be monotonous, the consumption of fluids fairly limited, alcohol, wines and beers forbidden. Cold water charged with carbonic acid gas, or plain water in which Vichy or Kissengen salts have been dissolved, may be given in limited amounts. The daily program of treatment that has been found satisfactory is that of V. Hoesslin[1]: 6:30 A.M., cold sponge, walking or other exercise for half or three-quarters of an hour; 7:30, breakfast, tea or coffee with cream, one slice brown bread, thickly spread with butter; 9:30, one egg or slice of fat bacon; 10 to 12:30, exercise; 12:30, lunch, bouillon and egg, fat meat with salad, an apple, brown bread and mineral water; 1:30 P.M., rest and then a cup of tea or coffee; 3:15 to 6:15, exercise; 7:00, dinner of proteid food and green vegetables chiefly. Billiards or skittles may fill up the evening. The various dietaries suggested by Oertel, Ebstein and Anders[2] may be used to vary the plan of V. Hoesslin. Sleep during the daytime should be absolutely forbidden, the patient to go to bed at 11 P.M. and rise at 6 A.M. during the summer and 7 A.M. during the winter, not more than six or seven hours of sleep for the adult and eight hours for the child. Exercise is of great value and its use in the open air must be insisted on. This may consist of walking for half or three-quarters of an hour after each meal—that is to say, four or five times a day. The time spent in exercise should be short at first and gradually increased, likewise the gait changed from a quiet to a brisk movement. In this respect women are refractory patients. Gymnastics and out-of-door sports, if wisely regulated so that overstrain is not produced, will break the monotony of the treatment. Oertel believes in graduated exercise up slight elevations and inclines, beginning with slight efforts and gradually increasing them. He has laid out at his sanatorium special walks with this in view, it playing an important part in his system of treatment. He believes that it directly and methodically invigorates the heart muscle. In severe cases the exercise sometimes cannot be taken. In these vigorous massage, or, what is better, mechanical massage and vibration, may be substituted until the patient is able to exercise. Sir Andrew Clark and others have suggested the use of the stair in the treatment of obesity. The patient should start from the top of a tall building and descend the steps. Later

1 V. Hoesslin: Edinburgh Medical Journal, 1895.

2 Oertel, Ebstein, Anders: [illegible] "System" Analytical Cyclopedia of Practical Medicine," Vol. III, p. 114, 1902.

ascensions are made. Muscular activity must be extended over three or four hours daily. The reason for this is the muscles are better nourished and absorb more food supply in direct proportion to the length of time muscular action is continued.

Hydrotherapy is of value in obesity, and should have for its aim moderately prolonged cold baths; it is valuable *per se* and as an aid to all other measures. We may start with the wet sheet pack at 65° F., continued for one hour, followed by the half bath at 60° F. for three minutes. The writer prefers the use of the electric light bath, hot air or vapor bath, or superheated dry hot air, used until profuse perspiration takes place, followed by some cold tonic procedure. The preference should be given to the electric light bath continued for fifteen, twenty or even thirty minutes, or superheated dry hot air, general application for one hour, producing profuse perspiration, followed by a soap shampoo and half bath, temperature 70° F., for three minutes, followed by the jet douche at 65° F. to the spine and all over each extremity, and a strong fan douche to the abdomen and chest, total duration one minute, temperature of the water to be gradually lowered to 50° F. and the force of the douche increased. These baths will be found invigorating, stimulating and oxidizing. The patient should dress quickly and exercise for an hour in the fresh air.

Swimming, where prolonged for one or two hours daily, combines two factors capable of fat destruction, viz., cold and exercise. Swimming is not, as a rule, hard upon fat people, whose bulk enables them to float easily in the water. Where this desideratum cannot be attained, the full bath at 102° F., in which the patient sits and makes movements, may be substituted, although it is nothing like as good. The water should be gradually reduced to 75° or 70° F. and the duration range from fifteen to thirty minutes. If the patient begins to shiver and the hands and feet to get cold, the bath must be stopped. It is an excellent plan to finish the treatment with the shower or jet douche at 60° F. for fifteen to twenty seconds, applied to the spine, back, legs and arms.

Hot applications for the reduction of flesh should never be too greatly prolonged, and are finished by a vigorous cold application. A short general cold application following an application of heat for the purpose of producing perspiration to reduce weight in obesity, has the effect of restoring and increasing the disposition for muscular effort, in addition to the tonic effect upon the general nervous system. This enables the patient to add to the spoliative effects of the hot bath the still more positive effects of prolonged muscular exercise.

In those cases in which the subjective signs of heart involvement, dyspnea and palpitation, are present, the graduated climbing or walking of Oertel is of great benefit in conjunction with the use of the

Nauheim or Schott method of treating heart disease. These baths should be commenced at a temperature of 94° F. for five minutes and gradually increased in acid and alkali, in time and temperature, until 76° F. is reached, with twenty minutes' duration.

In conjunction with the above treatment arsenic, strychnia and thyroid extract may be used.

Rachitis.

Rickets is a nutritional disease, occurring in early childhood, characterized by changes in the structure of the bones, with consequent deformity, muscular weakness and nervous symptoms. Its causation is unknown, but syphilis, foul air, unhygienic surroundings, dampness, poverty, all predispose. The negro is especially subject to the disease. In rickets all the tissues are diseased, though the bony tissues are particularly affected. The aim of treatment should be to at once get the child out of its surroundings and change its diet; sunlight and fresh air, if possible, at the seashore or in the country. Denizens of the city and those too poor to send children away must keep them out in the air, upon the roofs, in the parks, or make daily excursions to suburban parts. The diet should be at once changed, and the nursling fed by means of pasteurized milk; older children must be given much fats, butter, milk, cream, purées of vegetables, eggs, lentils, beans, brains, sweetbreads, oranges, lemons, grapes, etc. Phosphate of lime, syrup iodide of iron, lime water, etc., are indicated.

Hydrotherapy is very useful. The best method is the daily use of the full warm bath at 98° to 100° F. for ten to twenty minutes, followed by a brief, brisk cold sponge. Commence the treatment by giving each morning (in a room of proper temperature) the full warm bath, the first day ten minutes, increasing each day two minutes until twenty minutes is reached. As soon as the bath is finished, rapidly sponge the child. The first day the water should be 90° F., and each day the temperature is lowered one or two degrees until 70° F. is reached. The sponging must be general and very quickly performed. Manual massage is of unquestioned value, and used in connection with cocoanut oil will aid in increasing weight. Galvanism or the galvano-faradic current from nape to epigastrium, or the spinal form, one pole at the nape, the other upon the sacrum, may be employed. Institutional methods embracing these three treatments daily make prompt showing in rachitic cases.

CHAPTER XV.

DISEASES OF THE KIDNEY AND BLOOD.

Renal Hyperemia.

Congestion of the kidney consists of an increase in the amount of blood in the vessels of this organ, characterized by pain, frequent micturition, scanty, high-colored urine, containing albumin and sometimes blood. It most frequently originates from cold and exposure, though it sometimes occurs where irritating substances are eliminated through the kidneys. Mechanical causes produce a passive hyperemia, usually from obstructive conditions, originating in the heart, lung or liver. An endeavor should be made to treat the disease as soon as possible, and upon ascertaining the cause this must be removed and the patient at once put to bed upon a liquid diet, or, what is better, milk in very moderate quantities. A dose of calomel, followed by a saline, and bland alkaline drinks, should be administered. The author does not believe in copious water-drinking with the idea of promoting diuresis, believing that this can be best accomplished by the ice-bag or cold compress applied to the lower third of the sternum. Those methods that produce free and active perspiration, and by their action drive the blood to the surface of the body, should be at once employed to assist in relieving the internal visceral congestion. The writer's preference is decidedly for the use of the body apparatus, superheated dry hot air, and he believes that in these conditions of the kidney this produces quicker diaphoresis than almost any other form of treatment. The method that has given him the greatest satisfaction is the following: Superheated dry hot air for twenty, thirty or sixty minutes, according to the case, at temperatures ranging from 200° to 300° F., followed by the dry blanket pack for twenty minutes, during which time fomentations are applied over the kidneys. Where this method is not accessible we may employ the hot full bath for one-half hour, after which the patient should have light friction to further favor cutaneous congestion and elimination, followed by the fomentation over the kidney. In the same way as the superheated dry hot air we may employ the ordinary hot air bath, electric light bath and steam baths. In this condition the Turkish bath has proven of great benefit, acting in the same general way that other measures do that produce an increased skin circulation. Winternitz suggests the use of the cold air baths at 50° to 70° F. for two to five minutes, but the writer has never found them of much value. Prompt measures

of the character indicated will oftentimes prevent a renal hyperemia becoming an acute nephritis, of which it may oftentimes be considered to be the primary stage. Convalescence should be marked by a careful return to the diet suggested for chronic Bright's disease and the use of the different measures that are suggested under that heading.

Acute Nephritis.

Acute parenchymatous nephritis, or acute Bright's disease, is an acute inflammation of the epithelium of the uriniferous tubules, characterized by fever, scanty, high-colored urine, dropsy, acute uremia and more or less nervous symptoms. It occurs most frequently from exposure to cold, especially wet cold, though irritant drugs occasionally produce the disease. It is common in children following acute infectious diseases, especially the exanthemata. In the management of acute nephritis time is an essential factor, and the physician must move quickly in establishing those measures that will take the load off the kidney and prevent destructive changes. The patient should be placed absolutely at rest in a warm bed, be clothed in woolen underwear, and the room itself kept sufficiently warm to favor perspiration. The diet must be liquid, and where the patient is able to withstand entire removal of food nothing should be given but plain water and hot lemonade. The author is not in favor of the drinking of large quantities of water in this disease, as harm is frequently done by so doing. He believes that very moderate use of water, preferably hot, sipped with a teaspoon, will go quite a long distance toward allaying thirst and overcoming nausea should it exist. The bowels should be moved by means of calomel and a saline, and kept active by the administration of a high hot saline enema at least twice daily. While it is our endeavor to produce prompt perspiration and maintain same, excessive diuresis should not be aimed at. Where the secretion is very scanty we may increase it by the use of the very hot fomentation over the kidney at 140° to 160° F. for twenty minutes every three hours, and by the application of the ice-bag over the lower third of the sternum. The writer believes that hydrotherapy is the most certain and valuable therapeutic weapon for the management of this disease. There is an intimate reciprocal action between the skin and kidney, for while diaphoresis stimulates this compensatory action of the skin it must not be forgotten that it is not done for its eliminant action alone. Even under free action of the skin only a moderate degree of elimination takes place as compared with the kidney, but its influence is certainly beneficial and stimulates other organs that would otherwise refuse to act. Any number of methods are open to the practitioner. Where access cannot be had to hospital or sanatorial treatment, we may em-

plog the hot full bath at 100° to 110° F. for twenty to forty minutes. This is especially a valuable procedure with children when followed by the full dry pack for twenty to forty minutes. To both of these methods may be added gentle superficial friction in order to maintain active circulation in the skin. There is no fixed rule to guide one in the administration of these measures; some cases do well, some do not; it is largely a matter of careful trying. In sanatoria the hot air bath, electric light bath or superheated dry hot air are valuable. The author much prefers the latter, administering the general application in the body apparatus for twenty to sixty minutes at 200° to 300° F., followed by the hot blanket pack for thirty minutes, with the simultaneous use of the fomentation to the kidney. The action of these methods is to divert half or two-thirds of the blood in the body to the skin, acting in this respect like a great suction pump, relieving the internal congestion, together with the interference of function that results therefrom. There is danger from chilling, and too great care cannot be exercised in this regard, as chilling of the surface will undo all the benefit derived from the heating measures. Should cardiac weakness develop, the ice-bag over the heart for fifteen minutes every two hours may be employed. Cerebral symptoms are best met by the cold cephalic compress or cold-cap to the head.

Chronic Nephritis; Chronic Parenchymatous and Chronic Interstitial Nephritis.

Chronic parenchymatous nephritis is a chronic inflammation of the cortical tubular structure of the kidney, characterized by albuminous urine, dropsy and attacks of acute uræmia. Chronic interstitial nephritis is a chronic inflammation of the interstitial connective tissue of the kidney, slow in progress, characterized by the passage of large quantities of pale urine of low specific gravity, albuminous; disorders of the gastro-intestinal and nervous systems. It is nearly always accompanied by cardiac hypertrophy. Chronic nephritic changes are usually in their incipiency cardio-vascular, before the true kidney conditions commence to be present. These cardio-vascular conditions are accompanied by high blood-pressure, hypertension, as a result of which disturbances occur in those organs that are supplied by end-arteries, chief among which are the kidney, retina and brain. The most frequent influences that are said to produce the disease are exposure to cold, alcohol, hepatic disease, and certain nervous influences, especially worry, grief and anxiety. The writer is inclined to believe that the origin of chronic nephritis is most frequently to be found in those who are given to the habit of constantly over-eating, as a result of which their systems are continually saturated with toxins circulating in the blood. In such cases we find the metabolism of the body lowered and elimination by every channel diminished. With the

digestive disturbance comes an hepatic torpor or inability to cope with the flood of poisons circulating through the liver; the liver cells become incapable of eliminating or destroying these toxins. The final result of all this is a state of malnutrition upon which is superimposed nephritic and other constitutional conditions. The prognosis as to a structural cure is, of course, unfavorable, but excellent results may be obtained and life preserved for many years by the institution of proper treatment. It seems to the author that much of the gloomy prognosis would be abated provided the patients could always have access to an intelligent management of their cases, and were willing to patiently follow out the treatment. As ordinarily treated, it is a grave and serious disease; under favorable treatment these patients live many years of great comfort and usefulness.

A quiet life, free from anxiety, worry and care, is to be sought, and, if possible, found—certainly a difficult matter. The out-of-door life in an equable and uniform climate is very desirable. How few can seek the magic and health-giving climates of Egypt, the Riviera, Pasadena, Cal., or Palm Beach! The diet should be varied and liberal. It should be mixed, and our endeavor should be to feed the patient rather than run the risk of letting him become anemic. Carefully watch the digestive disorders, which can frequently be regulated by lavage and hydrotherapeutic treatment. We may allow a general mixed diet, from which tea, coffee, cocoa, alcohol, cabbage, rhubarb, cheese, lobster, fried and greasy foods have been removed. Meat should never be eaten in excess, and at best in moderation twice daily. Saundby truly remarks: "Eat sparingly of butcher's meat, avoid malt liquors, spirits and strong wines." In the author's opinion, Crofton[1] is unquestionably correct in restricting the quantity of water to be drunk. From a no small experience I can confirm absolutely his observations along this line. Of the limited amount of water allowed we may permit the patient to use the ordinary diluent table waters. The clothing should be warm and arranged to meet the seasons so as to prevent chilling. Constipation must be systematically treated, and a regular movement from the bowels secured. Excesses of all kinds must be scrupulously avoided, especially sexual. Hydrotherapy is of great value, its aim and action being to relieve the diseased organ and place it at rest as nearly as possible, and by securing this functional rest we maintain the renal parenchyma in good condition. Moderate sweating and active skin action, favoring elimination and improving the nervous system, should be our aim; too energetic sweating is bad. In the parenchymatous variety sweating measures have in the author's hands given so much satisfaction that in his practice he has practically limited his treatment to their use as a hydrotherapeutic measure. Commence with the wet full pack at 90° for twenty

1 Crofton, A. C.: "Medical Therapeutics," 1906.

minutes. Increase the duration five minutes and decrease the temperature three degrees daily until 70° F. is reached. The duration at no time should exceed one hour. If the heart is accelerated and respiratory action quick, we may apply an ice-bag to the heart over the pack. The action of the treatment is to lower blood pressure, besides influencing the patient in the manner outlined under the section in which this measure is treated. The other measure is superheated dry hot air, using the body apparatus at a temperature of 200° to 300° F. for twenty, forty or sixty minutes, keeping the head cool by means of an ice-bag, and in this case, as in the pack, applying the ice-bag to the heart if its action is much accelerated. Either of these measures should be followed by the horizontal or circular rain bath at 70° F. for one-fourth minute. Note should be taken that in this treatment no hot water is administered in the rain bath.

In the cirrhotic form we may employ superheated dry hot air at 200° to 300° F. for twenty to thirty minutes, or the electric light bath for five to ten minutes, followed by the dripping sheet at 70° for three minutes, accompanied by vigorous friction. As soon as the patient reacts well we may substitute for the dripping sheet the circular rain bath at 104° F. for one minute, reduced to 70° F. for one-half minute, twenty pounds pressure, increasing pressure one pound daily until thirty is reached. Note that the temperature is not reduced below 70° F. If the heart is perturbed the treatment may be followed by the use of the ice-bag to the precordium from fifteen minutes. Under this treatment it will be noticed that arterial tension is lessened, digestive disorders improved, bronchitis removed and the nervous system markedly toned.

The Turkish bath is very frequently prescribed in these conditions, but it must be most carefully used and prescribed under the physician's order. This bath is usually left to the unintelligent administration of bath boys who know nothing of pathology, and for that reason cannot intelligently administer it. The carbon dioxide baths and graduated exercise, that constitute the Schott system of treating heart disease, are quite useful in these cases. Commence with Na_2CO_3 100 grammes, and HCl 100 c.c., temperature 93°, duration five minutes. The aim is to lengthen the duration, lower the temperature and increase the CO_2 present. With this in view we increase the Na_2CO_3 and HCl 100 grammes every other bath until 600 to 800 is reached. Every other day increase the duration one minute until the patient remains in the bath twelve to fifteen minutes. Lower the temperature one degree every other day until 85° F. is reached, beyond which point it should not be lowered. The action of this bath is to dilate the peripheral vessels in the skin by the irritation that the gas produces; to reduce blood pressure, lighten the work of the heart, preserve this organ and produce the stimulating and tonic

effects that follow in their wake. It has a beneficial influence also in removing dropsy if it exists. As an associative treatment the author has found massage and static electricity of considerable value. Some cases demand nitroglycerine, digitalis and Basham's mixture.

Uremia.

Uremic poisoning is a term applied to a group of nervous symptoms produced by the retention in the blood of excrementitious substances normally excreted by the kidney. The condition arises most frequently during acute and chronic nephritis, and is due to a failure on the part of the kidney to eliminate some or all of the poisonous elements that enter into the composition of the urine. Its import is grave, depending on the chronicity of the cause. The prodromal stage should be the signal for immediate attention. Withhold all food and move the bowels freely by catharsis. Immediate free perspiration should be secured, and to this end we have access to three procedures. Where the patient is confined to bed we may use the hot full dry pack or the hot-air bath administered in bed. Where the patient is up and able to have access to sanatorium treatment the superheated dry hot air applied to the entire body at a temperature from 200° to 300° F. for twenty to thirty minutes will be found most effective, and, in the author's opinion, the most certain measure against this condition. No matter what measure to secure perspiration is utilized, it should be followed by a very brief tonic cooling measure, taking care to avoid chilling. In bed-ridden cases use the sponge and in ambulatory cases the rain bath at 70° F. for one-fourth minute. These treatments may be applied once or twice daily, and between them the fomentation over the lumbar region at 140° F. for ten minutes and repeated every hour. The patient should be urged to drink freely of hot water, lavage of the stomach practiced and high enemata of hot saline administered at least twice daily. Where this does not seem to prove effective, resort should be had at once to hypodermoclysis, administering seven to ten ounces of hot saline. During the entire time that we are utilizing the above measures we should employ the precordial compress over which an ice-bag of sufficient size has been placed to embrace the heart and lower third of the sternum. The influence of this hot application is to strengthen the heart action and by reflex influences stimulate the circulation, flush the kidney with arterial blood, favor abundant elimination of both water and toxins. The after-treatment is that of chronic nephritis.

Nephroptosis—Floating Kidney.

See "Splanchnoptosis."

Renal Colic.

Renal colic results from the passage, or attempted passage, of a calculus or gravel from the pelvis of the kidney through the ureter, and is characterized by agonizing pain in the back, retraction of the testes, vesical irritability with sudden termination of the pain. The calculi are formed by concentric lamination with some foreign body acting as a nucleus. The Roentgen ray is a fairly satisfactory aid in diagnosis. During the attack our immediate aim should be the complete relaxation of the patient and the relief of pain. This can best be accomplished by the drinking of very hot water, the use of the hot enema and the hot full bath as hot as it is possible for the patient to stand. Higher temperatures can be secured if cold is applied to the head and an ice-bag to the heart. An excellent method is to just submerge the body in the very hot water without the water touching the ice-bag upon the heart. After the removal of the patient to bed very hot fomentations at 140° F. may be applied to the lumbar region for ten minutes, repeated every thirty minutes as may be needed. Morphia is oftentimes necessary. Between the attacks treat the underlying condition, which is usually that of gout or lithæmia. Care should be exercised to avoid overeating and the use of alcohol. Free drinking of water, the use of Vichy water and the citrate and carbonate of potassium are to be recommended. These cases are nearly always surgical in their aspect, and the treatment above outlined is temporizing only in its results. In any event, the surgeon should be consulted with regard to each case of this character.

Anæmia; Chlorosis.

These are symptomatic disorders of the blood, characterized by a deficiency of some of its principal constituents, especially the red corpuscles and hemoglobin, which are gradually reduced. These are pale people, who are affected with many nervous symptoms, cardiac palpitation and brain, and oftentimes menstrual disorders. They originate in those who have suffered great loss of blood, who are the subjects of overwork, anxiety and grief, who are housed and lack bodily exercise, who are compelled to remain in badly ventilated and overheated offices and schools. In young girls they frequently arise from an unequal development of various physiological functions. Many are the subjects of splanchnoptosis. In a somewhat extended experience it is my personal opinion that the greatest number of these cases originate in diseases of the digestive organs, generally accompanied by a relaxation of muscular fiber. They fail to digest and assimilate, are the subjects of marked toxemia, of ptomaines and leucomaines arising from the digestive tract, as well as the retained waste products of tissue change. Such cases, as a rule, have suffered

from chronic constipation for years, paying little or no attention to the calls and necessities of nature. It is to this class that Sir Andrew Clark has given, in my opinion, the apt designation, "fecal anemias." Hydrotherapy is as nearly a panacea for the treatment of these cases as exists in medicine. When we stop to reflect that this agent stimulates the nervous centers and gives to them increased tone, rouses the temporarily dormant vital powers, deepens the respiration, increases the absorption of oxygen and the elimination of carbon dioxide, stimulates the appetite and digestion, increases assimilation and absorption, overcomes digestive disorders, relieves constipation, improves and increases the blood and lymphatic circulations, betters muscular tone over the entire body, enhances tissue change and increases excretion, it is no wonder, then, that it soon overcomes anemia and chlorosis and restores the body to vibrant health and strength.

We should first seek in the treatment of this disorder for causal factors. Fresh air is beneficial, and so is moderate exercise, but care should be taken to avoid overexertion in these cases, as they do not stand it well. Breathing exercises are of great value to these patients. Where the case is weak and bed-ridden we may commence with the full dry pack, followed by the cold sponge at 70° F., reduced two degrees daily until 50° F. is reached. This treatment is to be followed by general friction after the entire body has been carefully rubbed down. As soon as the strength and reaction are somewhat developed we may administer the dripping sheet at 70° F. for three minutes with vigorous friction, having the patient stand in a very hot foot-bath. The best time for this is in the early morning, while the patient is warm in bed, the collection of heat upon the surface favoring reaction. When this point has been reached it will be found that the full wet pack at 65° F. for half to one hour, followed by the half bath at 70° F. for one minute, may be instituted. Decrease the temperature of the bath two degrees daily and lengthen the time a half minute until the temperature of 60° F. and duration of three minutes has been obtained. In ambulatory cases we may administer the electric light bath or hot-air bath until commencing perspiration. Follow this with the circular or horizontal rain bath at 102° F. for one and a half minutes, pressure twenty pounds, dropping the temperature to 70° F. for fifteen seconds. Reduce temperature one degree daily to 60° F. and increase pressure one pound daily until thirty is registered. At this point we may place the patient upon full treatment, the following being the best, in the opinion of the author: Electric light bath until commencing perspiration, followed by the rain bath at 104° F. for one and one-half minutes, jet douche to the spine at 60° F. for one-fourth minute, fan douche at 60° F. to entire body, pressure twenty pounds, gradually increased to thirty. It is the author's opinion that the electric light bath is by far the most valuable

of all heating procedures, not only acting as a stimulant *per se*, but seeming to bring out more vigorous corpuscular response. Under its use the hemoglobin rapidly increases. It is a good plan, especially in toxic cases, to permit the patient to perspire freely every third day.

Certain rules should govern the administration of hydrotherapeutic measures in these disorders, among which may be mentioned the avoidance of the reduction of body temperature and to exercise care to increase the heat upon the surface before applying any cold measure. We can obtain in anemics the best and most vigorous nervous stimulation by very brief cold applications under considerable pressure, owing to the percutient stimulation. Many of these cases suffer from insomnia, and should this occur the neutral bath for thirty to sixty minutes, or the hot and cold sponge to the spine, will promptly relieve the condition. For the cardiac palpitation nothing equals the precordial compress and ice-bag. It goes without saying that certain medicinal measures should accompany the administration of hydrotherapy, the author expressing a preference for Blaud's mass in large doses and the various forms of arsenic, especially the acid and Fowler's solution.

Pernicious Anemia; Splenic Anemia; Leukocythemia; Hodgkins' Disease.

Pernicious anemia is a progressive form which tends toward a fatal issue. Its treatment and management is the type of method to be pursued with the other forms enumerated above. Their cause is unknown, but it follows pregnancy and lactation with great frequency, and is usually supposed to be due to a breaking down of the corpuscles or some defect of hemogenesis, possibly brought about through some intestinal toxin or micro-organism. There are a certain number of cases that are curable, and in these arsenic is the remedy—Fowler's solution, from three to forty minims per diem. Hydrotherapy can materially aid in improving the general nutrition and enhancing the effect of the arsenic. We should at once correct any gastric trouble present, and, if necessary, use lavage, being careful to do so in the morning before breakfast, so as to rob the patient of no nutriment. Intestinal antisepsis is an important indication, and to secure this, thymol has been found to be the best in these cases. The writer has also used permanganate of potassium covered with a coating insoluble in the gastric juices. The diet should be simple, plain, concentrated and nutritious, at times predigested. Free water-drinking, high enemata and hypodermoclysis of normal saline solution have all been found useful. For the improvement of appetite we may employ the ice-bag over the stomach for thirty minutes before meals. The general application found most satisfactory has been the electric light

for three to five minutes, or until perspiration commences, followed by the rain bath at 100° F. for one and one-half minutes, reduced to 70° F. for one-half minute. Reduce the temperature one degree daily until 60° F. is reached and maintain the pressure uniformly at twenty pounds. These cases do not stand strong douches or much cold, and are cases that must be closely watched and reaction secured. The baths, as a rule, should be given every other day until the patient begins to improve, when they may be administered every day.

CHAPTER XVI.

DISEASES OF THE HEART AND BLOOD-VESSELS.

Pericarditis; Endocarditis; Myocarditis.

Pericarditis is an inflammation of the serous covering of the pericardium of the heart. It may be primary or secondary, acute or chronic. In some cases it runs its course unsuspected, at times is difficult of diagnosis, at other times self-evident. It is especially prone to occur during rheumatic attacks, the heart sounds appearing near the ear and limited in number. The disease of itself calls for and demands absolute bodily rest in bed, with freedom from worry and excitement; laxatives, especially salines, should be administered. The diet must be concentrated, nutritious, liquid. The ice-bag applied over a precordial compress acts as a powerful antiphlogistic, quieting cardiac action and mitigating the severity of the pain. There is no danger in the proper use of the ice-bag, and it may be continued for weeks without any injurious or unpleasant secondary effects. From time to time it should be removed and the precordium rubbed with a dry crash towel. The ice-bag can be alternated with the precordial compress at 60° F. In the chronic stage of the trouble we may have recourse to the full wet pack at 60° to 65° F. for a half to one hour, care being taken to place the ice-bag over the heart during the administration of the pack.

Endocarditis is an inflammation of the membrane lining the cavities of the heart, accompanied by pain, precordial distress and disturbed cardiac action. This inflammation influences mostly the valves of the heart, producing a systolic apical murmur. It is often the origin of emboli, and the harm that it does is usually to lay the foundation for ultimate failure of integrity of the valvular structures or cause serious embolic attacks, the worst of which are those in the cerebrum. It is usually secondary to some other disease, especially the infectious fevers, rheumatism, etc. Bacteria are usually found in the lesions. Slight cases recover without much damage, malignant ones die. The aim should be in therapeutics to quiet the heart and conserve its tissue as much as possible. To do this absolute bodily rest is essential, care being taken to not even lift the patient up in bed. The diet must be liquid, easily digested, mostly milk. In this disease the ice-bag or cold compress at 60° F. must be kept constantly to the heart, although it is an excellent plan to remove the ice-bag every half to one hour and apply friction to the precordium. There is no danger in the ice-bag, which may remain on for days, having been found to

calm the patient, relieve the dyspnea and oppression. No other hydrotherapeutic treatment during the acute stage should be instituted.

Chronic endocarditis, usually a sequel of the acute form, may develop, however, in a healthy valve, being caused by habitual muscular overexertion, gout, alcohol, etc. The valves become deformed and thickened. The patient in the chronic stage must be gradually trained to hydriatic measures. Place the case in a full dry pack, followed by the cold sponge at 70° F., applied only to the upper and lower extremities for the first two days; this in turn to be succeeded by the ice-bag to the heart for one or two hours. The next two days we may administer the cold sponge to the entire body, and as soon as the patient responds well to this treatment we may then apply the dripping sheet at 70° F. for one minute with vigorous friction, followed by the ice-bag to the heart for one hour; increase the duration half a minute until the maximum period of three minutes is reached; reduce the temperature one degree daily until 65° F. is reached. In connection with the dripping sheet, general massage will be found to be of great benefit. At this stage the Schott exercises may be commenced and the patient gradually advanced along this line.

In *myocarditis* caution must be used in the application of the ice-bag and high altitudes avoided. The same cautions with reference to the use of the carbon dioxide baths and Schott exercises in arteriosclerosis apply with equal force to myocardial inflammations.

Treatment of Chronic Organic Disease of the Heart and Blood Vessels.

There are certain general rules and laws applicable to all forms of diseases of the heart and blood-vessels, and in order to avoid useless repetition the author will first lay down these general principles and rules for the guidance of patients, will enumerate the various methods of therapeutics, their uses and advantages, and will then consider the special diseases in which they are applicable. Many cases will be found in which one, two or even more lesions are present at the same time, and it is here that the practitioner who follows this line of therapeutics will have to use his sound judgment based upon the well-known principles of this therapy. Prescribing for cardiac cases requires us to mix some brains with the prescription if success is desired, and as this field is by far the most promising and certain of all methods known at the present day for the purpose of relieving these diseases, it behooves the student and physician to carefully study and consider the methods to be employed. Schott[1] very clearly stated

1 Schott, Theo. "The Treatment of Chronic Diseases of the Heart by Means of Baths and Gymnastics," London Lancet, Vol. I, p. 1345, 1891; "The Mineral Waters of Nauheim, Their Uses and Effects," 1898; "Balneo-Therapeutics and Medano-Therapeutics Applied to the Treatment of Chronic Heart Disease," New York Medical Record, 1891; "Chronic Diseases of the Heart," New York Medical Record, June 28, 1902.

that benefit may be expected to accrue in all cases of chronic heart disease, whether of valvular or parietal incidence, except where the myocardium has reached an advanced stage of degeneration or the vessels are the seat of aneurisms or far-advanced arterial sclerosis. It becomes a matter of indifference whether the incompetency depends upon valve lesions, muscle disease, or is the result of general disturbances of nutrition or disease of the vessels, thus making it suitable for all forms of chronic heart disease, neuroses of the heart, Graves' disease, etc. The rule to govern prognosis is that the cardiac muscle must be capable of response to the stimulus of the baths and exercises in order to be able to undergo compensatory hypertrophy.

Such a broad statement can only be appreciated when one knows the intellectual and scientific calibre of the man making the statement. In order to successfully achieve results the physician must be in a position to devote a great deal of time to his patients, and they in turn must methodically and intelligently obey his instructions to the letter, taking sufficient interest in the "cure" to secure satisfactory results.

In the early stages of the disease the physician himself must superintend the administration of the baths, the rest between them, and should himself first administer the resistive exercises, for he alone can in bad cases judge of the time required between the exercises for rest.

There are three aims in the treatment of cardiac disease: (1) Reduce the abnormal systemic resistance to the column of blood in the general vascular system; (2) sustain perfect functional cardiac activity for such a length of time as to produce (3) compensatory hypertrophy. It should be remembered in considering the first aim we have in view that the capillaries of the human body are the masters of the circulation, and it is to these that we must look for the relief of the abnormal systemic resistance, for it may be stated that the greater the resistance of the arterial system the greater the strain upon the heart; overcome this, and we are less likely to have dilatation. Where we secure active dilatation of the peripheral blood-vessels we "lift the load" from the laboring heart, the *vis a fronte* is improved, the *vis a tergo* strengthened through the thermic irritation that acts upon the vascular network of the skin. This is best accomplished by general measures, as these stimulate the respiration, increase oxygen absorption and CO_2 excretion. As the respiration is increased it sucks the blood like a great pump into the lung tissue, relieving the right heart, preventing venous stasis and returning the re-oxygenated and rejuvenated blood to the left heart. It increases the general muscular and nervous susceptibility, relieves toxemia and improves the general well-being. Alcohol, digitalis and other cardiac stimulants do not have to be dispensed with during the use of hydrotherapy in

the treatment of cardiac disease, but where they are demanded smaller and more infrequent doses have to be used, as the treatment seems to develop an increased susceptibility to the action of these drugs.

Hoffmann[2] says that much can be learned from a comparison of heart sounds. Little can be expected of digitalis when the second sound is weaker at the base than the first sound. This state of affairs he calls the "cold-water heart," and needs no medicinal management. In these cases the precordial compress and ice-bag and the full cardiac method of Schott are very useful. Deep breathing is of especial assistance.

In this connection it may not be amiss to say that alcohol diminishes the work of the heart, but also lessens its working power; digitalis increases the working power, but increases the work to be accomplished by the heart by increasing peripheral resistance. Both are toxic substances and add to the toxemia present. Cold applications, on the contrary, increase the working power of the heart, diminish the work to be done, eliminate and destroy toxins, and, no matter how long used or how protracted, do not diminish cardiac susceptibility. Even where drugs fail the heart will oftentimes give prompt response to hydriatic measures, and where we find that the heart fails to respond to cardiac stimulants and yet responds to hydrotherapy, then a favorable prognosis as to the continuance of life and to improvement, even though temporary, may be given, though the results are more often permanent. Local cold stimulates the heart muscle and strengthens its contractions, and this continues for a long time after removal of the application itself. Local applications may be used to supplement the invigorating action of general measures. Carbon dioxide baths increase the vascular capacity by dilating the arterioles, lessening the heart's work by diminishing the peripheral resistance, the pulse becoming slower after the baths and exercises than before them, the arteries fuller. The dilated heart shows a smaller area by percussion due to diminished amount of blood in the heart chambers and to the better cardiac contraction. As the baths are repeated the speed of the heart in the interim progressively diminishes until a normal rate is reached. They should always be succeeded by a rest of one or two hours. Their action is to lessen the frequency of cardiac contraction, increase diastole, shorten and improve systole and thus bring about better cardiac nutrition.

The general law may be stated that hot baths weaken the heart, cold baths strengthen. Where it becomes necessary, then, to use sweating measures and cardiac complications contraindicate their use, we may employ the electric light bath or superheated dry hot air in the reclining position with ice-bag to the heart, or the heating procedures to the lower limbs alone. General cold friction is one of the

2 Berliner klin. Wochenschrift, No. 34.

best measures for cardiac stimulation, as complete general reaction is secured without the displacement of blood to the interior.

Summing up the advantages of hydrotherapy, we may say that it invigorates the heart's action, enlarges the volume of the pulse, better fills the arteries, lessens irregular heart action, reduces the resistance in the general arterial system, deepens respiration, favors the absorption of any exudates that may exist, and gives to the heart increased power with diminished work. The author has found in treating this class of cases that it is oftentimes best to commence the course with the use of massage one day, the baths the next, and at the end of two weeks' treatment commence with the resistive exercises. These baths must be applied with some system and with a view to the condition of the patient, it being well to commence with a small amount of saline and gradually increase.

In administering the exercises more care and attention is, in the author's opinion, required for success than in the administration of the baths. Exercises of any kind are contraindicated in the early stages of valvular disease, and should never be administered, as at this time absolute rest is indicated. When this state has passed the question of their use arises. They are indicated up to the time compensation is established, but exercise should not at this period be discontinued. To put it more clearly, Schott's system is to be pursued under strict medical supervision, together with the carbon dioxide baths, until compensation takes place, to be followed by a gradual system of after-treatment of moderate exercise, preferably hill-climbing, using the system laid down by Prof. Oertel, the changes and gradations being governed by the medical attendant. Compensation once established, exercise must still be taken, although strain or sudden violent exertion is to be avoided. Heart cases, as a rule, take too little exercise, and they should be stimulated in this regard. Active, strenuous and restless patients must be watched and guided, while the sluggish, timid and fearful ones must be urged to strive more actively. The patient should know his trouble in the right way, for he holds the result in his own hands. From the date of recovery he will have to adjust his mode of life to his condition, and this will require an intelligent conception of his own case. It is a good plan for such patients to keep themselves under restraint until the restraint becomes a habit; they should be deliberate in movements, avoid dancing, running for cars and muscular strains, keep all their passions under perfect control, mentally as well as bodily. The best forms of exercise are those that are taken in the open air, but if this cannot be obtained exercise should be taken when and where it can. For middle-aged and elderly people, riding and golf are the best forms; for the young and vigorous we may allow them within limits to ride the bicycle, swim, play tennis and baseball. Breathlessness

and palpitation are the danger-signals all must watch. Cheerful surroundings, pleasant company, the gentle intellectual stimulus of pleasant conversation, entertaining reading and good music are found to be beneficial to these cases. Their clothing must be adapted to suit the season, and where financially able they should, in winter, seek the balmy air of Florida or lower California, and in summer the cool and stimulating breezes of Michigan and Maine in this country. There are certain measures that are dangerous to those suffering from organic heart disease and should never be employed.

The baths that are contraindicated are the full cold bath, cold jet, hot-air bath, superheated dry hot air, Turkish bath, Russian bath, full hot bath, or prolonged baths of any kind. It must be borne in mind, however, that the electric light bath and superheated dry hot air may be at times administered with the use of the ice-bag to the precordium.

Schott Resistive Gymnastics.

The movements are all *gentle*, "resistive" gymnastics, the slight resisting force employed being supplied either by the attendant or by the patient's own muscles. The former is the better plan. In the latter method the patient makes a gradual effort of contraction of certain sets of muscles, at the same time resisting the contraction with the opposing groups of muscles, this increasing the work done. For example, instead of freely and slowly flexing the arm, the extensor groups are called into action to resist the flexors to the needed extent. This should only be permitted in patients of intelligence and quick apprehension, and not in them until the ordinary resistance by a physician or an attendant has been used often enough to demonstrate to them how the work is done and what amount of resistance should be offered. To use "self-resistance" properly requires a little practice to acquire control of the separate muscle-groups. The exercises begin with simple movements, and are so arranged as to bring into service in succession nearly every group of muscles in the whole organism. The movements are made very slowly, with a steady uniform motion, and with a short interval of rest (fifteen to thirty seconds) after each; no movement is repeated twice in succession. If there is the slightest sign of dyspnea or increased speed of breathing or pulse the least tendency to cyanosis, sweating or palpitation, the movements should be stopped at once, and if relief is not experienced the patient must lie down for a few minutes. The clothing should be loose everywhere, that there may be no interference with the peripheral circulation.

The patient must not be allowed to think that the exercises are intended to effect any muscular development. In weak persons some gain in this direction may incidentally be made, but the object in

view is to produce certain results upon the heart and blood-vessels, and this should be brought about with an almost inappreciable amount of muscular exertion, certainly without enough to fatigue.

The patient may either sit or stand during the exercise, according to his strength, but some of the movements, it will be seen, must be performed standing. The person in charge stands facing the patient or beside him, as may be needed, and makes gentle resistance to each movement. It is important that the attendant's resisting force should be used in such a manner as not to impede the circulation in any of the vessels; the hand should either be applied to the part pressed upon with purely flat pressure, or, if it be necessary to grasp a limb, this should be done with a light, not a close, grasp; the member should not be encircled by the hold. When the movements are for any reason intermitted, there must be no sudden change, and the patient's limb must be supported by the attendant in its return to an easy position.

The movements are as follows:

1. The patient, standing or sitting, extends the arms forward level with the shoulders, palms together, hands held slightly open. The attendant puts his open hands on the dorsal aspect of the patient's wrists and makes light pressure, while the patient slowly separates the arms until they are in transverse line with the shoulders. The attendant then shifts his hands to the palmar aspect of the patient's wrists and makes light resistance while the arms are returned to the original forward-extended position.

2. With the hand hanging by the side, the attendant supports the arm above the elbow with one hand. The patient flexes the forearm without moving the upper arm, until the thumb touches the shoulder, the operator's other hand resisting with pressure against the flexor surface of the wrist. The reverse movement of extension of the forearm is similarly resisted with pressure against the dorsal aspect of the wrist, the upper arm all the while steadied by the attendant's gentle grasp.

3. The arms hanging, palms forward, are abducted and elevated until the thumbs touch above the head, the attendant making resistance upon the radial aspect of the wrists; the arms are then returned to the original position, with resistance to the ulnar side of the wrists.

4. The hands, with the fingers intertwined, palms toward the body, are held at the level of the abdomen and then raised until they are above the head, resistance being made to the radial aspects of the wrists. In the return the attendant receives the wrists in the fork between the thumb and forefinger, with the backs of his hands toward the patient.

5. The hands hang by the sides, thumbs forward, palms against the thighs. They are raised forward and upward with the arms

straight and parallel until they are extended above the head. The motion is then reversed. The attendant's hands must make several changes of position to keep up a steady resistance during this movement, his fingers at first merely pressing the radial surface of the patient's wrist, then, as the arms are raised, lightly clasping the wrist with his fingers. During the downward movement the wrists are first received as in 4, in the fork of the hand; then, when the patient's arms are level with the shoulders, the ulnar aspect of the patient's hand and wrist should rest upon the forefingers and thumb of the attendant, and, finally, the downward motion is resisted by the fingers of the attendant gently clasping the ulnar aspect of the patient's wrists. The resistance to this movement, Dr. Ilealy Thorne says, "is the operator's *pons asinorum*, but it should be mastered."

6. The body is bent forward from the waist and then straightened up; resistance to the bending is made with a hand on the upper sternum and to the recovery of the erect posture by a hand on the upper dorsal spine, the attendant standing beside the patient.

7. The body is rotated from the waist, without moving the hips or feet, first to one side and then to the other, then returning to the original position. To resist this, one hand is applied flat upon the advancing shoulder over the clavicular-humeral junction, the other clasped over the shoulder which is being drawn back. The attendant will find it necessary to move one or two steps sidewise to maintain his relation to the patient.

8. The trunk is bent sidewise as far as possible without moving the feet, to the right, to the left, and to the erect position again. The attendant resists with a hand in the axilla of the downward-moving side, his other hand pressing firmly on the opposite hip.

9. This is a repetition of 2, namely, flexion of the forearm only, but in this movement with the addition that the hand is firmly clenched during the motion. First one arm and then the other performs the exercise.

10. This is like 9, but with the palm turned outward. The arms act singly in succession. Resistance is made as in 2 and 9.

11. The arm starts from the hanging position, thumb to the front, palm to the side, and moves forward and up to the vertical position. The hand is then turned palm down, and the arm lowered to the side. The attendant resists with one hand clasped about the wrist, substituting the upward pressure of his free hand during the descent of the patient's arm from the vertical position.

12. The arms are extended backward from the hanging position, parallel, as far as possible without throwing the body forward, and returned. Resistance is made with open-hand pressure during the backward movement, with a light clasp of the wrists during the return.

13. Standing by a table or chair, upon which a steadying hand may rest, the patient flexes the thigh on the trunk, and returns the limb to its original position. The movement is then repeated with the other leg. The flexion is resisted by a hand upon the lower third of the thigh, and the return by a hand under the same part. Only the thigh muscles should be brought into play in this exercise, the leg hanging loosely from the knee.

14. From the same position as in 13 the whole leg is extended forward and upward and then backward. The resistance should be applied above the ankle.

15. From the same position as in 13 and 14; or, supported, if unsteady, by both hands on a chair, the patient bends the lower leg on the thigh and returns it. Resistance is applied above the heel to the upward motion, in front of the ankle to the downward motion.

16. Same position as in 13. The patient makes a lateral outward movement of the whole leg to the limit of motion, and reverses it. Resistance is applied at the ankle.

17. The arms, extended sidewise level with the shoulders, are rotated from the shoulder-joint. The attendant resists by lightly grasping the wrist.

18. Flexion and extension of the hand are made on the forearm, returning to a right line with the arm. The attendant supports the arm at the wrist, and resists the movements by pressure on the dorsal or palmar surface of the hand, according to the motion.

Similar flexion and extension of the foot on the leg, with appropriate resistance on the dorsal and plantar surfaces, conclude the series.

Schott sums up tersely the principles involved as follows: "*Unsystematic exercise constitutes* a heart-weakening; systematic exercises, on the contrary, a heart-strengthening treatment.

Oertel's System.

Professor O. Oertel, of Munich, published in 1885 an elaborate original system of treatment for "*circulatory disturbances, enfeblement of the heart muscle, incomplete compensation in valvular lesions, fatty heart, obesity and changes in the pulmonary circulation*," founded upon ten years' observation of its usefulness.

"The important phenomena (observed in disturbances of the circulation) are purely physical. It is therefore possible to expect to re-establish the hydrostatic equilibrium by mechanical means and by reducing the fluids of the organism. Afterward, or at the same time, consideration can be given to the causes of the circulatory trouble, and especially to the repair of the broken compensation. The most important result, however, of the new method lies in the strengthening of the heart-muscle by gymnastic measures, in anæmia, in atrophy

of the heart, in uncompensated valvular lesions, in degeneration and fatty infiltration of the myocardium."

The Oertel treatment, for its best application, needs peculiar climatic and topographic conditions—a certain elevation above the sea, a constant, moderate climate, hills or mountains, with good paths carefully laid in even and known gradients, and hotels under real medical control, with exact diet schedules correctly carried out. It is enough to mention these requirements for any one familiar with the climate and resorts of the United States to recognize at once that these conditions are not now met in any place in this country.

The treatment is best carried out in a moderate elevation, 1,800 to 2,200 feet, as the air is drier and purer at such a height. Ascents should carry the patient even higher than this—3,000 to 3,500 feet or more.

Exercise is as necessary to keep the heart-muscles in good condition as it is for any other set of muscles in the body. The first indication is met, therefore, by working the heart, by walking, by hill-climbing in a slightly rarefied atmosphere, and, if these do not suffice or are not available, by suitable gymnastics. Palpitation and breathlessness will naturally occur, but need cause no alarm unless very persistent. The patient should be told, if he suffers in this way, to stand still and breathe deeply. He should carry a stout stick and use it as a rest, thus fixing the shoulders and giving the chest muscles a point to work from. He should not sit down, as breathing is less free in this position than when erect. In two or three minutes at most he will be able to go on his way.

As soon as exercise can be taken the patient should walk, on the flat or up-hill, according to his ability. It is to be remembered always that exertion, to have a good effect, *must go to the point of producing moderate fatigue*. As the strength improves, the length of the walk and the height of the ascent should be made greater. In brief, exercise causes a determination of arterial blood to the skin, sweating accompanies this, the venous pressure, especially in the renal vessels, is lowered, the cardiac and pulmonary activity and the arterial pressure are increased. The anticipated effects should show themselves within a reasonable time—six or eight weeks.

Compensation established by rest, and the dietetic matters regulated, we turn to exercise of the heart for the completion of the cure by permanent improvement in the cardiac power. The form of exercise must be one that can be measured with exactness, that will make no undue demands upon muscles as yet unable to respond to them, and yet will call sufficiently upon the heart and the breathing apparatus to produce the desired effect of strengthening them.

Once compensation has been fully regained, the heart must be trained by graduated exercises to do as much work as it can without

injury. Such work does not include sudden violent exertion, hard running, or the carrying of heavy weights. A person with a heart still weak from recent valvular disease, though competent for its work under ordinary conditions, should not attempt, for example, to run for a train.

Enough has been said already in speaking of the two systems to indicate the manner in which cases should be selected for treatment. Patients with moderate degrees of incompetence, or with moderate dilatation, and those who suffer with functional tachycardia, need gentle, increasing, measured gymnastic exercise, combined, if possible, with some means which shall dilate peripheral vessels enough to lessen the heart's work in forcing the blood through them. Patients suffering from fatty infiltration, general obesity, respiratory insufficiency and consequent imperfect oxygenation, will have their requirements best met by long-continued moderate general exercise, of which the most desirable form is hill-climbing, sufficiently severe to make considerable demand upon the lungs, and, with this, there must be a dietetic regimen in which quantity and quality are adapted to individual needs, of course, but generally of a character suited to those with a tendency to accumulate fat.

The resistance movements already described form an excellent preparatory course, to which the hill-climbing is an invaluable sequel.

Chronic Cardiac Disease; Organic Valvular Heart Disease; Mitral Regurgitation; Aortic Regurgitation; Tricuspid Regurgitation; Pulmonic Regurgitation; Mitral Stenosis; Aortic Stenosis; Tricuspid Stenosis; Pulmonic Stenosis; Chronic Myocarditis.

These conditions represent insufficiency and obstruction to the normal flow of blood through the heart; they are often associated together with, and most frequently have, endocarditis as their cause. Cardiac dilatation and hypertrophy may be present and frequently determine the treatment. In the early stages complete rest in bed is essential, and the treatment laid down for endocarditis may be followed. As the patient improves his life should be regulated and all nervous and mental strains, the extremes of passion, overwork and excitement avoided. The diet must be simple and given in small amounts, nutritious, easily digested, principally nitrogenized; the thirst may be quenched with pure water in small amounts taken frequently. Carbonated water should be rather avoided or very small amounts allowed. Great care must be taken to avoid digestive disorders, especially gaseous distension, which impedes abdominal respiration and venous circulation. Tea, coffee, condiments, alcohol and tobacco are to be forbidden. It is in these cases that the method here laid down has achieved some of its greatest results—that is to say,

the carbon dioxide bath, commencing with a small quantity of saline and carbonic acid gas, a higher temperature and shorter duration, in connection with the exercises. We may follow the schedule of Sandby or commence with a simpler formula of sodium carbonate and commercial HCl; this is the writer's favorite method. At the end of a week or ten days we may add the Schott exercises, and finally finish with Oertel's method if necessary. Where palpitation exists apply the ice-bag, coil or cold compress over the heart. The writer has found massage, mechanical vibration and the static current of some value in the general treatment of these cases. Governed by conditions, he uses strychnine, digitalis, nitroglycerine, arsenic and iron. The foregoing treatment is based upon the first stage of the disease, but where it has progressed to the second, we may then institute the following schedule of treatment: If the heart is very weak, put the patient at perfect rest in bed, placing the ice-bag over the heart for fifteen minutes, gradually increased to thirty, two or three times daily. As soon as progress is made place the patient in the full dry pack for thirty minutes, followed by the cold sponge to the upper and lower extremities; do this for two days, then twice daily for two days; then the full sponge twice daily at 70° F., followed by good friction. At this stage we can then apply the dripping sheet at 70° F. for one minute with vigorous friction; increase one-half minute daily until three minutes is the duration. Each application is followed by the ice-bag to the heart for one hour. The Schott system of exercises may be used with these bed patients with much benefit, care being taken to never give the exercises within two hours of the hydriatic treatment. When the duration of the dripping sheet reaches three minutes, we may, in addition to the Schott exercises, order gentle, general massage, and as soon as the patient can possibly stand the treatment the carbon dioxide baths. These cases frequently suffer from insomnia, and for this the hot and cold spinal sponge or the Chapman's ice-bag to the spine for one hour may be instituted. Where there is kidney disease we should limit the amount of water-drinking to one or three pints daily; apply the ice-bag over the heart and lower third of the sternum and the fomentation to the kidney. In the third stage complete rest should be enjoined, the dropsy treated and complications met as they arise.

Cardiac Dilatation.

This is an increase in the size of the heart, due to enlargement of one or more of its cavities. It is a failing heart, lacking in power and compensation, tending progressively to increase unless the cause is removed, and this fact should never be forgotten. Dyspnœa, palpitation, "sinking," precordial discomfort, cyanosis and disturbances of the digestive and nervous systems usually mark its course. The

pulse is frequent, irregular, of poor force, and its volume ill sustained. Its area upon percussion is increased, its apex impulse diminished. Dilatation usually originates from rheumatism, the acute infectious diseases, influenza, nephritis, etc. In acute dilatation complete rest and the use of the ice-bag constitute the essential treatment. In this disease the condition is most suitably met by the use of the exercises and carbon dioxide baths, especially where the dilatation is due to weak muscle. All other methods that increase arterial tension and capillary resistance should be employed. Final improvement depends largely on the vigor, nutrition and natural resistance of the patients.

Cardiac Hypertrophy.

This is an increase in the size of the heart due to increased thickness of the heart walls. The left ventricle is more often affected because of the systemic work thrown upon it. There is usually little subjective disturbance, though there is a strong cardiac impact, increase in area of percussion, with an accentuated second sound. It originates from increased demands on the circulation, a compensatory process, in nephritis, valvular lesions, obstruction to pulmonary circulation, long-continued muscular exertion and free indulgence in spirits. These cases are likewise helped by the carbon dioxide bath and the Schott system of exercise. The incandescent electric light bath may be used, commencing with a small number of lights, gradually increased; during its application apply the ice-bag to the precordium. The after-treatment should be that of a very brief tonic measure. Strümpel speaks highly of the value of the neutral bath at 90° to 93° F. for twenty to forty minutes daily, and the author can confirm his observation in this respect. Where the general circulation is much resistant, the nitrites should be administered in small doses.

Fatty Heart.

This embraces two distinct affections, fatty infiltration, in which there is an abnormal accumulation of fat on or about the surface of the organ and in the interstitial tissue, and fatty degeneration, the transformation of the cardiac muscular fiber into fat. They are usually the concomitants of general obesity. In infiltration the muscular fiber is weakened, tending toward dilatation. The obese frequently suffer with slight intermittence of the pulse, feeble apex beat and some enlarged area of dullness. It is more common in those who lead a sedentary life and occupation; certain races are predisposed to it. Heredity, age, sex, the ingestion of beer, sweets, starches and excessive indulgence at the table are among the commoner conditions that are found. Dilatation of the heart may frequently supervene unless treatment is undertaken. In the management of

these cases we should follow along the lines laid down for the treatment of obesity, in connection with the Schott method. It is an excellent idea to commence with the Schott system of baths and exercises supplemented by massage and later place the patient upon Oertel's method, which is especially valuable after the above course of treatment and which was really originated for the management of fatty hearts. The author has had considerable experience in the management of these cases and feels that where the treatment is early taken in hand relief and "cure" may be promised. Patients are prone as a rule to be careless with their exercise and diet during the time they are from under the supervision of the physician, and for that reason we should insist upon their following out a rigid "course" of treatment of five or six weeks' time each year. It is most difficult to convince them of the necessity of so doing.

Arterio-Sclerosis; Hypertension.

Arterio-fibrosis is a thickening of the walls of the arteries due to morbid changes in the intima, giving rise to a localized or general narrowing of the caliber or lumen of the vessel. Hypertension may exist independently of arterio-sclerosis but is indicative of a tendency toward vascular thickening. In true arterio-sclerosis the vessel wall is hard, the heart is hypertrophied; its second sound accentuated and snappy; the peripheral resistance increased. Cardiac dilatation may follow this condition. Dyspnœa, palpitation, headache, vertigo, pulsus, arcus senilis usually accompany the disease. It occurs most frequently in old age or in the middle aged, although I have seen the condition in patients under thirty. Heredity, alcohol, rheumatism, gout, malaria, syphilis, overwork and overeating tend to produce the trouble. These cases must lead a quiet, well regulated life, free from anxieties and worry, avoid excess in eating, use no alcoholic spirits and take courses of the nitrites and nitroglycerine. The diet should be simple.

Dietary change must not be too rapidly made, but its gradual regulation and change may be made within three to six months. No revolution is needed but a common sense method of limiting both the quantity and quality. These patients should avoid fluids with ordinary hearty meals, giving up soups, especially meat soups, and confining the use of all fluids to four or six ounces at a meal. In proper cases permit fluids between meals. When digested, milk is best of all. Increase vegetables and diminish meats. Use white meats, save in those of anemic tendencies, when red meat may occasionally be needed. Substitute digestible fish for even some white meat. Exclude game, save fresh white game. Discard sweets and starchy desserts, overseasoning, spices, and condiments. Contrary to the general idea, very moderate quantities of water should be drunk; this tends to increase the tension and do damage to the already overworked kidney

(see Chronic Nephritis) unless severe toxemia is present. Trincck has advocated the moderate use of water so "mineralized" as to resemble the plasma, containing as it does certain inorganic salts. Each 250 c.c. of water is to contain sodium sulphate 0.008, sodium chloride 0.1, sodium phosphate 0.003, sodium carbonate 0.005, potassium sulphate 0.008.

In the very early stages of the disease and in those who are vigorous we may commence the cautious use of hydrotherapy by administering the full dry pack followed by a rapid cold sponge, care being taken to keep the head cool. As soon as we have tested the reaction of the patient we may administer the electric light bath until perspiration takes place followed by the horizontal rain bath at 100° to 105° F. for one and one-half minutes reduced at first to 80° F. for one-fourth minute; pressure twenty pounds. Cautiously reduce the temperature one degree daily, studying the reactive capacity of the patient. Huchard[1] says that he has found the low-pressure neutral jet douche at 92° to 96° F., applied to either side of the spinal column for three to eight minutes, a powerful nerve sedative and circulatory help. He gradually passes to the neutral horizontal rain or circular needle bath for one to two minutes, gradually reduced to the point of pleasant coolness, this to be regulated by the patient. I can unquestionably substantiate his experience and statement that "heart disease and other pathologic conditions of heart weakness are very often dependent not only upon the heart itself and its innervation, but also upon peripheral innervation, and that when sedation occurs the general disturbance improves or erases." Hirschfeld believes that where they can be borne the hot full bath is an excellent home method; the skin becomes vascular, relieves the internal organs, lifts the load, relieves insomnia, increases metabolism and oxidation, eliminates waste materials and increases the vascular "habit" of the cutis. In most cases it is best to commence with the carbon dioxide bath, gradually increasing its strength as the patient responds. This method is especially valuable where we have a concomitant cardiac dilatation, as it strengthens the heart muscle.

Regarding the use of baths and gymnastics in arterio-sclerosis, J. Groedel, of Bad-Nauheim, who has given special attention to the treatment of arterio-sclerosis, contends that, although the increased blood-pressure, "considered as the usual consequence of treatment by the Nauheim baths, may, at first sight, seem to indicate that every patient with arterio-sclerosis should be excluded from a treatment by baths, a further increase of the high blood-pressure usually found in arterio-sclerosis must not only surcharge the heart more than is already the case, but also create the danger of the bursting of a cerebral aneurism, so often present in cases of arterio-sclerosis." He has by

[1] Huchard, M.: Traité de Médecine Hydrothérapie, 1904.

numerous observations been able to convince himself that baths can be prescribed for these patients "in such a manner that the increase of blood-pressure does not take place, or only in a very slight degree." If the temperature be kept almost at the point of "indifference"—that is, about 92° to 93° F. (33.2° to 33.8° C.)—the primary acute increase of blood-pressure caused by the contraction of the cutaneous vessels, and most to be feared, will be very slight, and if there be carbonic acid in the bath it will at the same time quickly disappear. If the skin of the patient be cooled somewhat by moistening the parts particularly sensitive to cold before entering the bath, the avoidance of that primary increase of blood-pressure, or, indeed, any shock whatever, will be the more certain. A similarly good effect is produced when the patient is only allowed to take half baths and the exposed parts of the body are wrapped up so as to prevent cooling. In most cases the amount of water can be increased little by little at each bath until a full bath is at length attained, but even then it is advisable to let the patient only submerge his body by degrees. Placing cold bandages on the bather's head is often indicated. By proceeding cautiously in this manner he has never had an unfortunate case in the course of a practice of twenty-two years in Nauheim.

Under what conditions is a course of baths indicated or beneficial in cases of arterio-sclerosis? It is mostly a question of diseases based on the same etiological principle as arterio-sclerosis itself, or such as usually lead to it. By combating these we can at the same time retard the progress of the sclerotic process in the vessels.

Angina Pectoris.

Angina pectoris is dependent upon organic disease of the heart or aorta. It is of sudden onset, with agonizing pain in the sternal region, a sense of constriction and impending death. The pain radiates to the back, shoulders and arm, especially the left. During the attack the patient is pale, motionless, haggard; the cold sweat stands upon the brow; sits or stands immobile. The attack may prove suddenly fatal or occur at irregular intervals. It is frequently found associated with other diseases—arterio-sclerosis, cardiac hypertrophy or dilatation, aortic regurgitation and feebleness of muscular power. It occurs usually after forty years of age, and is most frequent in males. Causative factors to be looked for are alcohol, syphilis, rheumatism, gout, diabetes, nephritis and la grippe. The attacks are often precipitated by over-exertion, worry and digestive disorders. There is usually sclerosis of the coronary arteries. Da Costa says that "hardly an affection of the walls or cavity of the heart, scarcely a morbid condition of the arteries that nourish it or spring from it, with which the distressing malady has not been observed to be associated." In most cases we find a large neural

element, toxic irritation, high tension or arterio-sclerosis. Schott believes it to be due to a further reduction of the muscular energy of an already enfeebled heart muscle, accompanied by pathologic sclerosis of the coronary vessels, plus the resistance of a contracted arterial system. It is a dangerous malady, but life may be prolonged for years. During the attack nitrite of amyl or nitroglycerine should be immediately administered, the patient placed in a recumbent position, friction applied to the limbs, and if the heart is beating weakly an ice-bag over the precordium. In the general management of the case we should forbid all stimulants, tobacco and coffee. The life should be regular and free from worry, the diet simple, the fluids restricted. The presence of arterio-sclerosis must be constantly borne in mind and proper treatment instituted. In these cases the full method of the carbon dioxide bath and the Schott system of exercise should be instituted, carefully graduated to suit the individual case, but most persistently and systematically followed out. The course of treatment is to be given for some months, depending on the case; time is allowed to intervene and another course instituted. These patients purchase existence, and even life itself, only by the care and attention with which they follow out instructions and take their courses of treatment. During the non-treatment interim the patient should take small doses of some nitrite and use the Chapman's ice-bag applied over the fourth dorsal to the third lumbar spinal segment once or twice daily for forty minutes. The writer has seen some good, he believes, come from the application of the galvanic current to the vagus in the neck and from the use of the static wave current. Some cases seem to do best upon nitrite of soda, two to five grains four times daily; others better upon erythroltetranitrate, grains one, three to four times daily.

Functional Heart Disease; Cardiac Neuroses; Cardiac Collapse; Neurasthenic or Weak Heart; Palpitation; Brachycardia; Tachycardia; Arhythmia.

The functional disorders of the heart are grouped together, as the general treatment of these conditions is similar and the author does not care to repeat needlessly treatment for separate states where they can be grouped. Certain forms of them require a few special applications, and these will be duly noted.

Palpitation is an undue and rapid heart action, the frequency of the beats being sufficient to cause discomfort, usually accompanied by more or less irregularity of rhythm. The heart becomes tumultuous. There is a sensation of precordial discomfort, violent beat against chest, face pale. It most frequently occurs from some sudden scare, nervous strain or excitement, and usually disappears after the cause is removed. It is more frequent in females than in males. It

is also caused by anxieties, business responsibilities and worries, fear, emotion, anæmia, digestive disorders, neurasthenia, excessive tobacco, etc. Physical examination shows a negative cardiac condition, and for that reason care should be taken to seek for the causal factors underlying the trouble and remove them.

Tachycardia is an abnormal rapid heart whose action is regular, unattended by other symptoms; perfect general and cardiac health may exist with this disorder present. We may have paroxysmal attacks due to fright and emotion, the pulse being so rapid, thin and compressible as to be uncountable. Care should be taken, however, to carefully seek for factors that produce tachycardia, especially the forms of exophthalmic goiter. The condition is probably due, as Woods says, to a lesion of the accelerator of the heart. Where exophthalmic goiter exists this disease should be treated, as the cardiac condition forms but a part of the symptom-complex. In all cases the digestive condition should be investigated, and if necessary lavage practiced and intragastric faradization used. In these diseases the ice-bag over the precordium is especially valuable, as it diminishes the number of cardiac pulsations, increases the systolic force by acting directly on the myocardium, increases blood pressure and respiration.

Neurasthenia, or weak feeble heart, demands no special treatment other than that embraced in the treatment of neurasthenia itself, to which section the reader is referred.

Arhythmia is a condition accompanied by cardiac irregularity both as to the time and power of the heart beat. The heart may intermit and miss a beat, a feeling that is very disagreeable to most cases. Many forms of the trouble exist—Trawles' pulsus alternans, in which one pulse is normal, the next feeble; Kussmaul's pulsus paradoxus, in which the heart beats more frequently, but weaker during the inspiration than expiration, this condition having been most frequently observed in pericarditis; pulsus bigeminus, or the double pulse—that is to say, a pulse in which we have two successive rapid beats, then two successive slower beats, most frequently found in mitral disease; delirium cordis, in which all these conditions may be present. These variations from the normal may exist in apparently well individuals, but, generally speaking, some disease is more or less present. Immediate relief and comfort may be secured by the application of the ice-bag to the precordium.

Brachycardia, or slow pulse, may give rise to no symptoms, although vertigo, tinnitus or headache may accompany the disease. It sometimes follows acute fevers, chronic dyspepsia, nephritis, apoplexy, cerebral tumors, general paresis, melancholia, sun stroke, etc. It is a rare disease in the author's experience. During the sudden attacks the recumbent position should be immediately sought

and a small dose of brandy or whisky given, diluted with very hot water. The underlying causal conditions must be especially treated in this disease.

Cardiac collapse or shock occurs most frequently after surgical operations, great strains or anything that tends to suddenly upset the nervous system. It may be again stated that the skin of the precordium is in special reflex relation to the heart, and that many patients could be saved by means of hydrotherapy alone without recourse to the hypodermic syringe were proper measures adopted. The proverbial ounce of prevention is, of course, worth more than the pound of cure, but where collapse is threatened or has occurred the ice-bag should be immediately applied over the heart; at the end of fifteen minutes removed and a very hot fomentation (140° F.) applied for one or possibly two minutes, followed again by the ice-bag. If possible the patient should drink hot water and the hot enema be given at once. Every care and precaution must be taken to prevent chilling, and the best method is the envelopeing of the patient in the full dry pack covered with several additional blankets. During the period that the patient is in the pack general stimulation of the nervous cardiac force may be brought out by short very cold applications of water to the face and nape of the neck. Very hot applications to the spine frequently have a rousing and stimulating effect. After the danger has passed general tonic measures should be adopted.

The general treatment of functional cardiac disorder should first embrace the relief of the patient's anxiety. These people, as a rule, are neurotic, excitable, living in constant and ever-present fear of sudden and impending death, the basis of which is the uncomfortable feelings associated with the heart. A general and nutritious diet should be instituted and care taken to eliminate all digestive disorders. Tea, coffee, liquor, tobacco and other stimulants must be forbidden. The most satisfactory method for securing permanent relief after the causal conditions have been met has, in the author's hands, been tonic hydriatic measures. Commence very gently by applying the full dry pack for twenty minutes, followed by the cold sponge rapidly performed, the patient being given a general friction with a coarse towel as a finishing treatment. After we have gained their confidence we may use the electric light bath or hot-air bath until commencing perspiration, followed by the dripping sheet at 80° F. for three minutes, with vigorous friction, daily reduced one degree until 70° F. is reached, at which point we may substitute the circular or horizontal rain bath at 100° to 104° F. for one and one-half minutes, reduced to 70° F. for one-fourth minute, under a pressure of twenty pounds, reducing the pressure one degree daily to 60° F. and increasing the pressure gradually to thirty pounds. Where there is

any discomfort during the administration of this bath from oppression or shortness of breath, we should instruct patients to open the mouth wide and breathe deeply, or apply an ice-bag over the heart during the application of the first bath or two. As soon as we have trained the individual to stand the above measures we should use the following: Electric light bath until free perspiration takes place, followed by the circular or horizontal rain bath at 100° to 104° F. for one and one-half minutes, this to be followed in its turn by the fan douche to the entire body for one-fourth minute and the jet douche to the spine and lower limbs for one-fourth minute at 60° F., under twenty to twenty-five pounds' pressure. It is really marvelous to see the changes that will take place in these individuals under this course of treatment. The pulse becomes normal, the arteries full, the neural element removed, the digestion and elimination improved, the skin pliable and rosy, and the patient begets an independence and confidence to which he has heretofore been a total stranger. In many cases it is advisable at the same time to administer digestants, hematinics and strychnia.

CHAPTER XVII.

DISEASES OF THE PERIPHERAL NERVES, BRAIN AND SPINAL CORD.

Neuritis; Facial Palsy.

Neuritis is an inflammation of the peripheral nerve trunks, associated with more or less degenerative changes in the nerves, and characterized by pain, impaired sensation, motor paralysis, atrophy and the reaction of degeneration. It most often originates from injury, compression, rheumatism, alcohol intoxications, infectious disease, gout, diabetes, etc. The outcome is generally favorable where the patient receives prompt and proper treatment. During the acute stage the patient should be put to bed, or, if it is that of a single nerve, the part put at absolute local rest. This is oftentimes best secured by means of a padded splint. Calomel, followed by a saline, should be immediately administered and the diet restricted to liquids or semi-solids. Search for any causal influences that are producing the trouble and treat the general condition.

It is the writer's invariable plan to divide the treatment of simple neuritis into that of general and local. The patient is placed upon a general eliminative treatment, consisting of either the electric light bath or the superheated dry hot air, administered until profuse perspiration takes place. The author's preference is decidedly for the superheated dry hot air, followed by the use of the rain bath at 104° F. for one and one-half to two minutes, reduced to 80° F. for one-half minute, twenty pounds pressure, reducing temperature one degree to 65° F. and increasing pressure one pound until thirty is registered. This treatment is given *once daily*, and during the interim the fomentation is applied to the affected parts at least once every two hours, and in addition once daily a stabile galvanic treatment is given. The author is satisfied, from no small experience, that this treatment has saved many cases long periods of treatment during the chronic stage, and has in cases of facial palsy been unusually effective. Where access cannot be had to the above general measures, we may employ the full wet pack at 80° F. for one hour, reducing the temperature two degrees daily until 60° F. is reached, and employing the fomentation and galvanic treatment as above outlined. The author has seen some good results, he believes, from the administration with this treatment of the salicylates.

In the chronic stage of neuritis we have to deal with the various paralytic, trophic and other symptoms left over from the acute attack. We may continue the use of the electric light bath or superheated dry hot air bath until profuse perspiration takes place, followed by the rain bath at 104° F. for one and one-half minutes, pressure thirty pounds, this in turn being followed by the fan douche to the body at 60° F. for one-half minute, pressure twenty pounds. As a finishing treatment, the Scottish fan douche to the affected parts, ranging from 110° to 115° F. for one-third to one-half minute to 60° F. for ten seconds, will be found a most valuable aid. During this stage we must continue to treat causal indications, realizing that they are the underlying factors of the disease, and unless removed are likely to prolong the treatment. In the chronic stage, where access cannot be had to institutional treatment, we may employ the full wet pack at 60° F. for one hour once daily. In connection with the above outlined treatment, the writer has found general and local massage, vibration and the galvanic current, applied to the paralyzed parts in sufficient strength to produce gentle contractions, a most valuable method or combination of treatment. Every endeavor should be made to avoid the use of morphine.

Sciatic Neuritis—Sciatica.

This form of neuritis and neuralgia is so frequent, so persistent and difficult of handling that the author feels it deserves special consideration, in view of the fact that the treatment herein outlined has proved, in his hands, almost a specific in the management of the disease. The sciatic plexus is made up from the lumbo-sacral cord by the anterior division of the three sacral nerves and part of the fourth. The sciatic nerve is in reality a continuation of the sacral plexus, and leaves the pelvis by passing through the great sacro-sciatic foramen, below the pyriformis muscle, and passing through the buttock between the tuberosity of the ischium and the great trochanter, it terminates at the popliteal space by breaking up into the external and internal popliteal branches, and finally ending in the tibial and cutaneous branches. It supplies the muscles of the back of the thigh, those of the leg and foot and nearly the whole integument of the leg. It is made up of motor, sensory, reflex, trophic and muscular sense fibers. It is the largest nerve in the body, and is most often diseased. The conditions that influence sciatic neuritis are those that cause neuritis of other nerves, although season has a more intimate relation to this disease than other forms of neuritis. The pathologic anatomy is that of a peri-interstitial neuritis affecting the adventitia. The nerve is usually edematous and swollen, and as a result of this condition pressure and irritation develop, affecting the nerve fibers secondarily. Inflammation may extend into the nerve

substance and fibers, in which case we may have true degenerative conditions. These manifestations are usually worse and more noticeable in that part of the nerve that is close to the sciatic notch.

Sciatic neuritis is one of the most painful and trying diseases of the nerves to which one may be subjected, the pain being intense, lancinating, boring and burning in character, much worse at night, with intense paroxysms which may be brought on from cold, movement, manipulation or other trivial causes. In the acute stage our aim should be to at once bring the patient under the general influence of constitutional treatment, besides adopting such local measures as will relieve pain, produce comfort and induce sleep. The author usually starts the treatment with the administration of a brisk mercurial, following this with a saline, and during the attack administers the salicylates or alkalies, avoiding as far as possible the administration of morphine and never using whisky. Care must be exercised in the handling of the leg in the acute stage, as well as the adoption of a very stimulating treatment. The treatment of the acute and chronic stages varies only in degree rather than method, and we will therefore consider the treatment of a chronic case of sciatic neuritis rather than separate the two. The diet should be plain, with no meat, and as far as possible gouty-free. In the acute stage it should be liquid absolutely. Large volumes of water must be drunk unless we have an associated arterio-sclerosis or cirrhotic kidney to deal with. During the acute stage rest is useful, and treatment is best administered in bed. Of all the methods of reaching sciatic neuritis or sciatica, hydrotherapy is the most satisfactory, and without mentioning other forms of treatment the writer will at once detail the method that has in his hands proved so satisfactory.

The patient is placed in the superheated dry hot air baby apparatus, carefully enveloped in Turkish toweling, at a temperature of from 250° to 350° F., care being taken to apply a cold compress to the head, or, what is better, the ice-helmet. The patient remains in the apparatus from one-half to one hour, during which time he perspires very freely. At the end of this time he is removed to the full dry pack so arranged as to permit the folds of the blanket to be open for ready access to the sciatic nerve. *Very hot* fomentations at a temperature of 140° to 160° F. are now applied and allowed to remain on from one to two minutes, these being kept up until seven or eight have been put on. The patient is then placed in a circular or horizontal rain bath at a temperature of 80° F. for one-half minute. Note should be taken that in this application no hot water is applied while in the circular rain bath. The patient is required to rest one hour after the treatment. Where the patient is bedridden and unable to be placed in the superheated dry hot air apparatus, we may apply the full dry pack and very hot fomentation as above described.

followed by a rapid general cold sponge and the application of a compress to the nerve itself. As soon as able, the superheated dry hot air should be administered. Patients, as a rule, progress rapidly under these measures, and as soon as the intense tenderness has subsided the Scottish jet douche should be applied, the temperatures ranging from 120° F. for thirty seconds to 60° F. for ten seconds, with four to six alternations, the application being made up and down the spine and the back of the leg. The finishing treatment should still consist of the circular or horizontal rain bath at 80° for one-half minute. Many springs, mud baths and other treatments have been suggested for this disease, and, judging from the cases that have failed to secure relief by these measures, the writer is forced to the conclusion that the baths at the springs either possess little or no value or are administered by persons who are not thoroughly versed in hydriatic procedures. As associated measures, general massage and the local application of the high-tension faradic from a very fine wire (32 to 36) coil, in combination with the galvanic current, will add to the sedative, stimulating and reconstructive powers of water. The static current possesses some value, and the author oftentimes uses these three in a detailed schedule of treatment. Drugs possess little value in the specific treatment of the disease, but the functional condition of the stomach and intestinal tract should be given attention in this direction.

Multiple Neuritis.

Polyneuritis is a parenchymatous inflammation affecting many peripheral nerves at once, but principally those of the extensors of the extremities. It may originate from bacterial infection, from toxic substances circulating in the blood, such as alcohol; from dyscrasic states, such as gout and rheumatism, or from anemia and malnutrition. It is a serious disease, and unless promptly and properly treated its mortality is fairly high. It is usually accompanied by pain, paralysis with wrist and foot drop, loss of the reflexes, sensory disturbances, trophic changes, reaction of degeneration, mental forgetfulness, and sometimes falsification of memory. In the acute stages our aim should be at once to remove all foreign or toxic substances from the system, and for that reason alcohol and tobacco are immediately withdrawn, especially in view of the fact that to attempt to "taper off" will be productive of harm rather than good. A purgative consisting of calomel and aloin, followed by a saline, must be immediately administered, the patient put to bed and at absolute rest. The question of rest is an exceedingly important one in this disease, and during the early stages it must be secured if we hope to preserve the patient and hasten recovery. The diet should be liquid, consist of milk, eggs, cereals and fruits; no

tea, coffee, cocoa or meats are to be allowed. During this stage the applications should all be hot. Once daily the patient is given the hot full pack for thirty minutes, after which he is to be rapidly dried, wrapped in blankets and kept warm for at least an hour before resuming the ordinary night dress. The most satisfactory application is the hot full bath at 100° to 110° F. for ten to fifteen minutes, although great care must be exercised in lifting the patient into the tub, best accomplished by means of a sheet, the lifting being done from either end. During the interim we may apply either hot circular compresses to the limbs affected, or dry heat to the extremities and over the abdomen. Where the pain is especially severe, in addition to the hot applications to the extremities, employ the fomentation at 130° to 140° F. to the spine, much relief in this way being frequently obtained. Where there is threatened cardiac failure, apply the ice-bag to the precordium for fifteen to twenty minutes four or five times daily. After the subsidence of the acute stage tonic measures may be instituted, of which the author has found the general wet pack for one hour at 80° F., reduced one degree daily to 65° F., a serviceable method. As soon as the patient is up and able to get about we should commence the administration of the electric light bath or hot-air bath until perspiration takes place, followed by the rain bath at 100° to 104° F. for two minutes, reduced to 65° for one-fourth minute. As associated measures use general massage, vibration and electricity; contract the muscles mildly, not too vigorously. These patients will oftentimes be found to be semi-ataxic, and in their case we may employ with benefit the re-education movements or exercises of Frankel, detailed in another section. Strychnia, per oram or hypodermatically, often proves of service.

Neuralgia; Intercostal Neuralgia; Tic Douloureux.

Neuralgia is a condition characterized by pain in the course of a nerve or nerves. The pain may be nearly continuous or paroxysmal, and sharp, boring, stabbing or darting in character. Tender points are found at the exit of nerves from bony channels or fascia of muscles. Hallucinatory neuralgia frequently occurs in those who are addicted to the morphine habit. Care should be taken to distinguish between neuralgia and neuritis. Neuralgias are anatomically divided into trigeminal, cervico-occipital, brachial, intercostal, lumbar, crural, sciatic and visceral. Sciatica has already been considered. Tic douloureux is a form of neuralgia due to an obliterating arteritis that usually accompanies arterio-sclerosis. Neuralgias may originate spontaneously—that is to say, idiopathic; may arise from toxic causes, be reflex, hemic or organic. It is a disease of adult life, women being more frequently affected than men, heredity often playing an important part. The rheumatic, gouty, anemic, and those whose consti-

tutions are generally broken down, become favorable subjects for the disease. It is frequently associated with other diseases and disorders, especially those of menstruation, insomnia, vertigo, neurasthenia, the morphine habit, etc. It has seemed to the author that of all causes provocative of neuralgia auto-intoxication plays the most prominent part. The toxins are absorbed from the gastro-intestinal tract, carried to the nerve centers, and may, in addition to being the actual cause of the nerve pain, precipitate fresh attacks in those who are already suffering from neuralgias due to other causes. The outlook is favorable for recovery in this disease; a guarded prognosis should be made as regards tic douloureux, although under the plan of treatment of Dana,[1] modified by the author, excellent results are secured.

In the treatment of various forms of neuralgia it is necessary to first become thoroughly acquainted with the causal conditions that underlie the particular case in hand, and search should be made for such factors as rheumatism, malaria, arterio-fibrosis and syphilis. Of the general treatment the author would insist upon the most careful consideration of the question of constipation, which nearly always is to be found in these cases. In addition, he believes that the removal of all narcotic and analgesic drugs should form a part and parcel of the treatment. Causal factors will demand certain kinds of medicines, and where the indications are clear we may give them unless the patient has been over-medicated, in which event all medicines should be temporarily withdrawn. The best climate for neuralgics is one of moderate altitude, sunny, sheltered from high cold winds and free from sudden changes in temperature. Many cases find California, the Bahamas and the Riviera satisfactory regions, although this factor is a negligible part of the treatment. Hydrotherapy may be used both locally and generally. Heat should be applied to the part affected, either by means of the coil or local superheated dry hot-air apparatus. Many patients have recourse to the hot-water bag, Japanese fire boxes, etc., but the writer has long since restricted his local treatment of neuralgia to the very hot fomentation, or the use of local superheated dry hot air at a temperature ranging from 250° F. to 400° F. for a period of from one-half to one hour. The fomentations may be applied once or twice daily. The general treatment of neuralgia resolves itself into the treatment of causal conditions and at the same time the restoration of the general health. This is best met by commencing with the incandescent electric light bath, continuing for a few minutes until the patient becomes thoroughly warm, followed by the dripping sheet at a temperature of 80° F. for three minutes with vigorous friction. Increase the light bath each day until the patient begins to perspire freely, and decrease the tem-

[1] Dana, C. L., "Text-Book Nervous and Mental Diseases."

perature of the sheet two degrees daily until 60° F. is reached, at which time we may proceed to the following full treatment: Incandescent electric light bath, vapor, hot air, or superheated dry hot-air body apparatus until the patient perspires very freely; remove to the horizontal rain or needle bath administered at a temperature of 100° F. one and one-half minutes, rapidly reduced to 60° F. for one-fourth to one-half minute. As soon as the patient reacts to this treatment we may use the heating procedure and follow same with rain bath for its general effects, and where it is possible and permissible, the Scottish or alternating douche at a temperature of 110° to 120° F. for twenty to thirty seconds, alternating with the temperature of 60° F. for five to ten seconds. This should be repeated four to six times, and the form in which the Scottish should be used, whether as fan or jet, must be determined by the anatomical region affected. Where possible, the jet is to be preferred. The writer believes the superheated dry hot air and incandescent electric light bath to be the two best forms of applying the heat in these cases. In tic douloureux the author has followed Dana in the use of massive doses of strychnia in conjunction with iron, and, where necessary, morphia, the local use of the fomentation, general applications of superheated dry hot air, and the horizontal rain or needle bath, carefully guarding the face during its application, with a compress wrung out of very hot water (120° to 140° F.). This method has in my hands yielded excellent results. In neuralgias of the viscera (stomach, ovary, uterus, testes, rectum, bladder, etc.) a very satisfactory local method is the use of the very hot fomentation (160° F.) over the affected organ, followed by the hot pack for thirty minutes at a temperature of 110° to 130° F. The patient should drink hot water freely, and the hot enema may be administered with advantage.

In cases of neuralgia, after recovery we may with advantage send them to the sea-shore to indulge in surf bathing, the advantages of which are many. As associated procedures of value we may mention massage, galvanism, high-tension faradic and X-ray treatment. Among the drugs most useful are iron, arsenic and the glycero-phosphates.

Meningitis; Cerebral Pachymeningitis; Acute Leptomeningitis; Tubercular Meningitis; Spinal Pachymeningitis; Spinal Meningitis.

These inflammatory diseases of the various membranes of the cerebrum and spinal cord have been grouped together because of their similar treatment, their names indicating the membrane or membranes involved and its location. Meningitis most frequently originates from traumata, purulent disease, caries, syphilis, acute infections, chronic alcoholism, Bright's disease, insolation, influenza and tuberculosis. It is usually accompanied by headache, delirium, vomiting, fever (103°

to 104°), rapid pulse, retraction of the head and abdomen, the tache *cerebrale* and Kernig's sign. The outlook is unfavorable, both to life and the many disabilities, palsies, headache, epilepsy and mental impairment that follow in its wake. The patient should be placed in a room which must be dark, quiet, cool, well ventilated, and in which there are no bright lights and no conversation. A much better prognosis can be given if the nurse is quiet, gentle and interested. The diet should be liquid, nourishing, and consist of milk, gruel, broths, koumyss, custard, etc., administered at regular intervals. During convalescence the patient may be frequently given eggs, cream, toast, cereals, minced meat, oysters, chicken, fish, fruits, breads and simple vegetables. All causal conditions must be treated, and where cases are of septic origin surgical intervention is necessary. Where a specific history can be obtained, mercury should be administered, preferably by injection. In the spinal variety much success has been obtained from the use of lumbar puncture and hydrotherapy. The method of Aufrecht is the one to be adopted. Prepare the full bath, filling the tub with water at a temperature of 95° to 100° F. Place the patient in the tub and gradually add water until the temperature reaches 104° to 105° F., or better, if agreeable to the patient. The duration of the bath should be from ten to fifteen minutes. The ice helmet must invariably be applied to the head and the cold compress to the nape of the neck. If great pain or tenderness exist, the bath-tub should be cushioned with sheets or blankets, and the patient carefully removed to and from the tub by means of the sheet. Upon removal from the bath do not dry the patient, but place upon a dry sheet and carefully cover with blankets, in which he is to remain for one hour. These baths, according to Aufrecht, should never be administered in the early morning hours or late evening. The rationale of this bath is to draw the blood from the brain and meninges to the skin; to increase the activity of the latter and the secretion from the sweat glands; to eliminate large quantities of toxins, and finally, by acting upon the cutaneous sensory nerve terminals, produce an anodyne and sedative effect. Cases are reported by Aufrecht and Vorochilisky in which the entire course of the disease has been rendered mild by these baths, and some cases, apparently hopeless, in which, in addition to this, lumbar puncture was performed, the recovery was prompt and satisfactory. It has been noted that after the administration of the bath the circulation improved, the heart action became better and the mind clearer. While the author's observations have been limited, still he can agree with Aufrecht as far as he goes, and believes that in addition the hot full bath possesses another feature too little considered in the treatment of this disease, and that is the relief of some of the most distressing symptoms that cause great mental anguish to the members of the family of the sufferer. It is unques-

tionably a fact that even though the outcome in the case is unfavorable, the mitigation of convulsions, delirium, jactitation, etc., is much appreciated by the onlooker, and the physician in charge will frequently receive praise for this if nothing else is accomplished. Where pyrexia is a notable feature the patient should have the cold sponge several times daily between the full baths. The ice-cap may be used continuously, or in the spinal type Chapman's ice-bags may be applied along the vertebræ; if necessary, the scalp should be shaved. The chronic sequelæ of the disease are best met by proper treatment, detailed in other sections. (See Cerebro-Spinal Meningitis.)

Cerebral Hemorrhage; Cerebral Apoplexy; Cerebral Thrombosis; Cerebral Embolism.

Cerebral hemorrhage or apoplexy, "a stroke," is an intracranial hemorrhage from the bursting or rupture of a blood-vessel, followed by an escape of blood into the cerebral tissues, causing considerable pressure, more or less localized destruction of brain substance, characterized by sudden onset, unconsciousness, irregular and noisy respiration, complete relaxation and paralysis, usually hemiplegic, the extent and location of which depend upon the size and position of the hemorrhage. The vast majority of hemorrhages within the brain occur from rupture of those blood-vessels that supply the great basal ganglia, the internal capsule and white matter known as the corona radiata. It is a disease of the later decades, occurring most frequently in the aged, those under forty to forty-five years usually being syphilitic. Heredity has some influence, but the so-called "apoplectic build"—thick neck, fat, florid people—does not predispose to the attack. The principal cause is an arteritis, fatty or atheromatous, followed by the development of miliary aneurisms, which rupture under excessive emotion, overexertion, attacks of indigestion or acute alcoholism. Strong contributing factors in the production of the arteritis are chronic nephritis, chronic gout, chronic alcoholism and syphilis. Cardiac hypertrophy associated with arterial disease is a dangerous combination for the production of cerebral hemorrhage. Immediately after the "stroke" the patient is found unconscious, breathing stertorously, one side paralyzed, temperature subnormal, rising later one to two degrees on the paralyzed side. In from two to six hours the patient usually regains consciousness, but is weak and confused. In the chronic state we find the patient a "hemiplegic," with paralysis of arm and leg, mild sensory symptoms, mind clear, and speech, as a rule, uninvolved or slightly so; improvement continues for some time, the leg improving more rapidly than the arm; there is rigidity, the reflexes exaggerated, ankle clonus and contractions present. There is always danger of a recurrence of an attack, owing to the disease of the vascular system—that is to say, the causes of the original at-

tack remain effective. The association of chronic nephritis with cerebral hemorrhage makes the prognosis grave.

Cerebral embolism and cerebral thrombosis, causing acute softening of the brain, is a condition brought about by the plugging of a blood-vessel with an embolus or thrombus, and is characterized by a sudden seizure, running a more or less similar course to that of cerebral hemorrhage. The plugging of the blood-vessel causes an anemia of the area to which it is supplied, and unless the collateral circulation is shortly established a localized or focal softening takes place. Embolism arises most frequently in endocarditis, infectious fevers, pregnancy and blood dyscrasias, while gout, syphilis, lead or fatty heart predispose to thrombosis. Atheroma is a frequent cause. The onset is sudden; the loss of consciousness or coma is less deep and of much shorter duration. There is an absence of stertor, flushed face, hard pulse. Thrombosis generally gives premonitory warning, especially if syphilitic, with vertigo, headache, temporary aphasia, cranial nerve palsies, numbness of the extremities; hemiplegia develops slowly. These attacks frequently take place without loss of consciousness, and may occur during sleep. After embolic plugging there are more spastic symptoms and fewer mental effects, owing to youth and freedom from arterial disease. Mental symptoms are more frequent in thrombosis. In terminal arteries where the plugging shuts off the entire blood supply, the anemia is followed by death of the part, or it undergoes necrobiosis, followed by reddish-yellowish-white softening. Upon the situation of the artery in which the embolus or thrombus lies will depend a number of symptoms, localized in character, which may determine whether we have to deal with diplegia, hemiplegia, aphasia, etc. The chronic stage is similar to the chronic stage of cerebral hemorrhage.

The writer is firmly of the opinion that hydrotherapy is one of the most powerful and successful agents for the prevention of cerebral hemorrhage, embolism and thrombosis, provided it is persistently employed as a means of securing health. The physiological action of hydrotherapy upon the circulation tends to keep the arteries active and elastic, owing to the powerful influx and efflux of blood to and from the cutaneous surface. The blood vascular "tone" produced by this exercise of the muscular structures of the blood-vessels is like the action of exercise in the prevention of stiffness in chronic joint troubles. It is certainly a well-established fact that toxins arising from the gastro-intestinal tract, and other poisons, such as those of lead and syphilis, circulating in the blood stream tend to produce atheroma, arteritis, and final sclerotic changes, until we have fully developed arterial sclerosis. In the author's opinion, for the reasons just enumerated, hydrotherapy exercises an influence for good that the average general practitioner is totally unaware of, and would more frequently

utilize were he to know of its vast power in the prevention of those diseases that have molecular decay and fibrosis as their terminal stage. From an experience in novice limited, the author has taken opportunity to observe the great value of this agent as a preventive of cerebral arterial disease. Where it is suspected that an attack of hemorrhage, thrombosis or embolism is supervening, the patient should be at once treated as though the attack had actually taken place, if good is to be secured.

Patients who have actually sustained an attack of cerebral hemorrhage, thrombosis or embolism, should at once be placed in bed at perfect rest, with the head and shoulders slightly raised, with no constriction of clothing or night garments, in a room that is quiet and darkened. Where there is much stertor and an excess of the secretions of the mouth and throat, he should be turned slightly to one side, so as to allow the tongue and palate to fall forward and the saliva and secretions to drain outward. Every care must be exercised to keep the mouth clean and antiseptic, the patient well protected from draughts and exposure to cold, as these cases are especially prone to an attack of pneumonia. Ice may be applied over a cephalic compress, best by means of a rubber cap that is bowl-shaped (see cut), and which can be so arranged as to produce no pressure upon the head. The ordinary rubber coil-cap or Leiter coils may be employed, using ice-water which is allowed slowly to run through. In addition the trunk compress at a temperature of 120° F. is to be applied, well protected by blankets or rubber tissue to prevent the loss of heat. The lower extremities should be wrapped in blankets, and hot-water bags or bottles applied to the feet. Where it is possible, it is best to apply to the extremities very hot circular compresses wrung out of water at a temperature of 140° F., in which a liberal amount of mustard has been stirred. In addition, a tepid enema can be given and two minims of croton oil, or a quarter of a grain of elaterium administered. Tincture of aconite, or, what is better, granules of aconitine (gr. 1-134—0005), dissolved in a teaspoonful of water, can be given every fifteen to twenty minutes until a distinct impression is made upon the pulse. Where possible, no food should be taken for twenty-four hours, and after this time the diet is to be liquid for at least three or four days. It has been the writer's opinion that it is advantageous to administer water in very small quantities as soon as the patient becomes conscious, and, in addition to the hydrotherapeutic measures suggested, give nitroglycerine (1-100 of a grain) three or four times daily. As the patient improves, we enter the chronic stage, and are now called upon to treat the general condition as well as the "hemiplegia." For this the writer usually commences with the half pack at a temperature of 90° F. for thirty minutes once daily, decreasing the temperature to 70° F. and lengthening the duration

until forty-five to sixty minutes is reached. As soon as the patient reacts to this treatment we may administer the hall bath at a temperature of 85° to 80° F., applying friction to the lower limbs and finishing the treatment with an affusion to the spine at 70° F. In ambulatory cases it has been my experience that the most satisfactory method of treatment is the following: Incandescent electric light bath until perspiration takes place, followed by the rain bath at a temperature of 100° F. for one to one and one-half minutes; reduce to 70° F. for one-fourth to one-half minute. The action of this bath is to keep the skin and kidneys very active and at the same time lower arterial tension, but in order to secure this desideratum the author continues the use of nitroglycerine in an alcoholic solution of five grains to the ounce, of which he gives five to six drops after meals, or uses sodium nitrite. In embolism and thrombosis, in addition to the nitroglycerine, we may use heart tonics, of which the fat-free tincture of digitalis is by far the best. The patient should lead a quiet and rather inactive life, taking sufficient exercise only to secure functional activity. As a rule, warm and equable climates are the best, and of these California, New Mexico, San Antonio, Florida, the Bahamas, the Riviera, etc., are suitable localities. Where we have to deal with cases in the chronic stage, in whom contractures are troublesome, whether they result from the absence of or improper treatment, we may employ the warm full bath, in which the attendant gently masses the limbs and stretches them. The author believes that he has seen some benefit result from this course of treatment. In addition we may use massage, the faradic, galvanic and static currents, applied for their general and local effects. Internally, the iodides and strychnia hypodermically are indicated. Physostigma sometimes assists in removing the contractures.

Acute Myelitis; Acute Poliomyelitis; Polioencephalitis Superior; Landry's Paralysis; Acute Bulbar Paralysis; Caisson Disease.

This group of diseases of an inflammatory character is treated on the same general principles, and for that reason the author has grouped them together for convenience and to avoid repetition.

Acute myelitis is an acute softening of the spinal cord, followed by secondary inflammation, generally transverse, and involving, as a rule, one or two inches of the cord. The inflammation is diffuse, affecting both gray and white matter of the cord, and has for its etiological factors exposure to cold, especially while undergoing severe muscular strains; infective fevers, septic infection and syphilis. Trauma and syphilis are by far the most important of the causes. Myelitis usually reaches its climax in a few days, remains stationary from fifteen to thirty days, and, should the patient live, we may expect im-

provement. This sets in slowly, provided there has been no great extension up and down the cord, involving vital centers and producing conditions unfavorable to life, such as vesical and rectal involvement, with subsequent kidney disease, etc. Most cases pass into the chronic stage; others get almost entirely well; some regain power and resemble cases of ataxic paraplegia. The cord appears soft, swollen, red, hyperemic, with distension of blood-vessels, swollen neuraxons, white and red blood cells, etc. The prognosis is guarded.

Acute poliomyelitis is an acute disease of the anterior cornua of the spinal cord, characterized by motor paralysis of rapid onset, followed by muscular wasting and absence of sensory symptoms, reaction of degeneration and loss of the reflexes. It occurs most frequently in children, other etiological factors being exposure to wet, season (June to September), infectious diseases, and possibly a predisposing influence of greater strain upon the spinal motor centers, due to the excessive use of the muscular system. There is a stage of invasion, with extensive muscular involvement; a stationary period; a period of retrocession and of improvement, leaving one or more members involved; and finally a chronic stage. The disease is an acute exudative inflammation followed by destruction of tissue without pus formation, affecting chiefly the anterior cornua of the spinal cord, certain cell groups in certain regions receiving the brunt of the disease, destruction of the neuron bodies taking place. Prognosis is good, though complete and perfect recovery is rarely attained.

Caisson disease, or diver's paralysis, is a more or less complete paraplegia, occurring in those who work in caissons under very heavy atmospheric pressure, ranging from fifteen to fifty pounds, and is usually brought about by the too sudden return to or "locking out" of the normal atmosphere. Different persons vary in their susceptibility to the action of changes in atmospheric pressure. The onset is usually attended with much pain in the legs, nausea, vomiting, headache and dizziness. The picture soon resembles that of acute myelitis, and lasts from a few hours to many weeks. In three cases seen by the author recovery was complete. For months afterwards neurasthenoid symptoms of fullness in the head, vertigo, fatigue of the limbs and tenderness of the feet existed. Under the heavy atmospheric pressure the blood is driven from the surface to the internal viscera, the sudden change of pressure causing a rapid reflux to the surface, this producing in the sclerotic spinal circulation a congestion, followed by punctate hemorrhages accompanied by some destruction of nerve tissue.

In the treatment of this group of diseases rest must be secured, and to this end the patient should be at once put to bed, calomel and a saline administered. Scrupulous cleanliness is essential, the patient being carefully watched to see if any red places form upon the back,

buttocks or limbs, the aim being to prevent the formation of bedsores. This end will be materially aided by placing the patient, if possible, upon a water bed, and where this cannot be obtained the using of air cushions. The room should be moderately darkened and quiet maintained. Special pains are to be taken to keep the sufferer warm, and in the case of children suffering from poliomyelitis the limbs should be wrapped in cotton or wool. Diaphoresis should be promoted by the free drinking of water and the administration of pilocarpine. In some cases tincture of aconite will serve the purpose of promoting perspiration, and at the same time combating the inflammatory process in the spinal cord. The diet should be absolutely liquid in the early stages, it being the rule with the author to never permit the use of meat until the inflammation has entirely subsided; gruels, barley-water, infant foods, purées of vegetables strained, milk, tropon, plasmon and similar preparations are very useful. The bladder should be constantly and carefully watched, and where there is evidence of the slightest irritation or the microscope shows the presence of pus, irrigations are to be commenced, using a hot saline or hot boric acid solution. Bed-sores can only be prevented by perfect cleanliness, bathing and the judicious avoidance of pressure by frequent change of position.

Hydrotherapy is most valuable in the treatment of these diseases in the early stage, and tends to prevent complications as well as acting in a reparative manner. In every case the coil, compress and fomentation can be used. The treatment may be given as follows: Apply the fomentation to the spine at a temperature of 140° to 150° F. for ten to fifteen minutes, following same with the trunk compress at a temperature of 50° to 60° F., over which we can apply to the spinal column the cold water coil or rubber ice-bag or Chapman's spinal ice-bag. The author believes that this treatment has marked prophylactic influences, and in one case he has seen signal good result from the treatment, in several others amelioration of the symptoms. It certainly tends to prevent bed-sores. The ideal method of treating these cases is by means of the continuous bath as originated and perfected by Reiss. It is comparatively easy to rig up a hammock in an ordinary bath-tub by fastening a sheet to the sides and covering the tub with another sheet or cloth to prevent the too rapid cooling of the water and breezes from striking upon the patient. (See Continuous Bath.)

In an endeavor to relieve pressure, promote cleanliness and bring about healing, Reiss immersed patients in a neutral bath at a temperature of 94° to 96° F. for hours, with the result that the sores healed and the other trophic phenomena disappeared. Where this treatment can be instituted we should commence with an immersion of one hour and an intermission, increasing the immersion until the patient remains from early morning until bedtime in the bath, and if the case is serious the entire twenty-four hours. It was during his

treatment of bedsores that Reiss noticed the marked improvement of the continuous bath upon organic diseases of the nervous system. Stearns recommends in poliomyelitis the immediate use in the acute stages of the high-tension faradic current, having personally assured the author of considerable success in its use. In those cases resulting from caisson disease[1] it is needless to say that prevention and prophylaxis are best brought about by the slow "locking-out" process. The subacute effects and chronic conditions that result from this inflammation must be treated upon the principles laid down under the heads of Chronic Myelitis and Neurasthenia.

Chronic Myelitis; Chronic Stage of Poliomyelitis; Chronic Stage of Acute Myelitis.

Chronic myelitis, as its name indicates, is a chronic inflammatory disease of the spinal cord, or a chronic reparative stage of acute myelitis, and may be transverse, diffuse, disseminated, marginal or central. It may originate from compression, and when this is the case it has that name as a prefix—compression myelitis. Chronic myelitis originating as a primary disease—that is *de novo*—is a rare disease, for it usually occurs secondary to an acute attack. It is a disease of adult life, more frequent in males, probably because of the greater frequency to syphilitic infection. It may follow the acute infectious diseases, lead and trauma. The secondary form is really a chronic stage of the acute form of inflammation that follows softening, hemorrhage or trauma. The pathology is that of a chronic inflammation, with the spinal cord gray, discolored, and shrunken at the level of the lesion, harder than the normal to the touch. Nerve tissue is lost, and a secondary growth of connective tissue takes place, the blood-vessels and their walls being increased and greatly thickened. Granular detritus, granule cells and neuron bodies in various degrees of degeneration are found, those parts adjacent to the area affected being markedly congested. As a result of the inflammation, secondary ascending and descending degenerations take place. The prognosis varies, many cases reaching partial usefulness and prolonging their lives for periods ranging from five to twenty years, this being especially true of dorsal myelitis, which is the most favorable form.

The chronic stage of poliomyelitis usually begins with the subsidence of the stationary period and the commencement of improvement, the chronic stage continuing from four to twelve or more months, the members most often affected by the acute disease being the lower limbs. The treatment may commence with the judicious combination of hydrotherapy, rest and exercise. Where the patient has been placed in the continuous bath of Reiss we may commence

[1] Smith, A. H.: "Physiologic, Pathologic and Therapeutic Effects of Compressed Air," 1901; Heller, Mager and Von Schrötter: "Luftdruckler Krankungen," Vienna, 1898.

with the use of friction two or three times daily for ten minutes, gradually increasing the length of time until twenty or thirty minutes is reached. The results obtained by this method with the chronic cases have been most satisfactory. With the subsidence of the inflammation and the administration of friction we may gradually reduce the temperature of the water from 94°—that is to say, neutral—to the temperature of 88° F., reducing one degree daily until this has been attained. Patients should be kept in the hammock from early in the morning until bedtime.

A most satisfactory method of treating these cases is the use of the half bath at a temperature of from 82° to 65° F., from five to ten minutes' duration. Commence with the temperature of 82° F. and reduce two degrees daily until 60° F. is reached, at which time the duration of the bath should be lengthened until it is given for the full ten minutes. It is essential that during its administration the limbs should be constantly rubbed or chafed—that is to say, friction applied during the bath. We may finish the bath with an affusion to the spine at 60° F. Reaction must be secured. In the same manner at the same temperatures, and for the same duration, we may apply the half bath in which twenty to thirty pounds of common salt has been dissolved, finishing the bath with an affusion at 60° F. and securing reaction. Care should be exercised to not rub the limbs too vigorously, as their trophic power is small. The writer is satisfied from personal experience that the Nauheim or carbon dioxide baths at a temperature of 95° to 84° F. act favorably in this affection. We may start with the temperature of 95° F., a duration of four minutes, and the bath containing 100 grams of acid and alkali, decreasing the temperature two degrees, increasing the duration one minute and the acid and alkali 100 grams each bath until a temperature of 84° F., duration of ten minutes and a strength of 500 to 700 grams of acid and alkali are reached. There is a sense of warmth, increased circulation, some better power, and a general feeling of comfort succeeding the use of these baths. Care should be taken between times to keep the limbs warm, and to this end the feet are clothed in warm socks or stockings and canton flannel or woolen undergarments worn. As a part of the system of treatment and as the patient progresses we may commence the use of massage, galvanism, faradism and sinusoidal electricity. Suspension sometimes gives excellent results, and in some instances orthopedic apparatus such as braces may be advantageously employed. Children suffering from acute poliomyelitis may be taught the use of their limbs by the use of suspension trolley apparatus. With the increase of power patients must be taught to walk, exercise and use the limbs, this being accomplished by means of gymnastics, tricycles, etc. Adults should be taught the use of crutches and made to walk with them and the aid of an attendant.

Where they can be carried out the *Paralexchritt* of Frænkel, or the so-called "Frænkel exercises," may be employed with great satisfaction. Should patients desire a change of air and scenery, we may send them with advantage to the sea-shore, where they should remain in the open air and sunlight, using the sea-water to continue the half baths previously mentioned.

When the patient reaches the ambulatory stage of his chronic condition we may commence the use of active hydrotherapy, such as the administration of the electric light bath until perspiration takes place, followed by the horizontal rain bath at a temperature of 100° for one and one-half minutes, pressure twenty pounds, reduced to a temperature of 70° F. for one-fourth to one-half minute. Patients frequently gain great relief from the girdle sensation, sensory disturbances and muscular spasm by the application of a gentle douche or spray at a temperature of 70° F. as a "finishing" treatment to the above. Where this does not prove effective we may apply the fomentation over the affected part for ten minutes, followed by a partial or half pack or a compress at a temperature of 70° F. All cold applications must be carefully graduated to suit the case, and should, in my opinion, never be applied but once daily. Where patients do not respond well to active hydrotherapeutic measures in the chronic stage we may administer the half pack. Commence with a temperature of 96° F. and a duration of fifteen minutes, gradually reducing the temperature two degrees daily and lengthening the duration five minutes until 70° F. and one hour's duration are reached. We may at the same time administer tonic drugs in the shape of iron, quinine, strychnine and phosphorus.

It is hardly necessary to remark that all treatment must be most patiently and persistently followed out, the bladder carefully watched and irrigated, the nerve tone improved by all tonic measures, nutrition stimulated, the patient trained to combat the disease, mental and moral control exercised, and the circulation kept at its highest and most active point. This is best accomplished by the hydrotherapeutic measures detailed above, in conjunction with a general system that embraces massage, electrotherapy, exercise, and such medicinal measures as are needed.

Chronic Degenerative Spinal Diseases; Locomotor Ataxia; Spastic Spinal Sclerosis; "Lateral Sclerosis"; Combined Spinal Scleroses; Ataxic Paraplegia; Multiple or Disseminated Scleroses; Ataxic Paraplegia; Multiple or Disseminated Ataxia; Amyotrophic Lateral Sclerosis; Chronic Muscular Atrophies.

Locomotor ataxia is a chronic spinal disease due to a primary degeneration of the sensory neurons located in the posterior columns

of the spinal cord, the sclerosis being secondary to the degeneration of the neuraxons. It is characterized by incoördination, pains, anæsthesia, visceral, trophic, and other symptoms. The disease is one of adult life, occurring most frequently between thirty and fifty. Exposure to wet and cold, over-muscular exertion, excessive dancing, railroad traveling, and irregular living are predisposing causes. Syphilis has by far the most important influence in the production of the disease, for it is especially prone to occur in syphilitics (60 to 90 per cent.), though it is not a syphilitic disease, this merely predisposing the neural elements to degeneration by altering their physiological condition. It occurs mostly in the intelligent and cultivated classes and in those subjected to causes producing leg weariness. The pathology shows a characteristic change in the spinal cord, posterior spinal ganglia, posterior nerve roots, and to a certain extent in the peripheral nerves. Upon section the spinal cord shows the shrunken and grayish appearance in the posterior column. In these columns the white matter has been seriously affected, the neuraxons having to a great extent disappeared, their place being taken by connective and neuroglial tissue. The question as to whether syphilis is a cause of locomotor ataxia has been discussed, and it may be said that its action is certainly that of predisposing to the degenerative condition; in fact, locomotor ataxia is the débris left in the wake of the storm. As a result of luetic infection there is a predisposition of the nerve tissue tending to decay and death. As the degeneration takes place, nature, abhorring a vacuum, fills in with sclerotic tissue. The diet should be generous and as far as possible little restriction placed upon it consistent with the state of the digestive system. It should be a mixed one in which vegetables and fats predominate; dairy products, especially milk and butter, should be freely used. Much has been written with regard to the use of stimulants in these cases; it is best to give no tea, coffee, beer, wines, liquors or tobacco, but extended observation has taught me that judgment must be used, especially in cases where there has been long-continued use of these articles. If moderate use does no harm we must remember that taking them away robs the patient of a great luxury. Rest is an essential element in the treatment of these cases, it being best to secure nine to twelve hours daily. Early to bed and late to rise is a good motto. Very active walking must be avoided, and any strain upon the spine or legs is absolutely contraindicated. Of general exercises, driving during the worst stages and golfing during convalescence are probably the best. Care must be exercised in general hygiene. Cold should be avoided; warm clothing and underwear worn in winter. When the ground is wet or slick gum shoes are essential. Corns should never be cut. In summer light cool underwear and thin clothing are advisable. A close study should be made of how to improve the general nutrition,

as this will aid the neural elements to quicker and better assert themselves.

The treatment resolves itself into one of mechanics and nutrition. There is no question but what hydrotherapy is of unusual value in these cases. It is usually best to start the patient upon the use of the half bath, the tub being filled to a depth of about twelve or fourteen inches with water. Commence with a temperature of 85° F. and a duration of three minutes. While the patient is in the bath he should steady himself by holding to the sides of the tub, the attendant at the same time vigorously rubbing the lower extremities, kneading and massing the deeper structures as well as the superficial ones. The bath is finished by an affusion of cold water poured down the spine. Reduce the temperature one degree daily until 65° F. is reached, and at the same time lengthen the duration of the bath to five or even seven minutes. The spinal action may be enhanced by a previous salt rub. The bath is finished by hard friction with warm Turkish towels. The action upon the body of the agitated water, accompanied by friction, stimulates the peripheral nerves, dilates the superficial blood-vessels, deepens respiration, increases oxygenation, exercises a calming as well as stimulating effect on the sensory nerves, removing muscular and nervous debility. Of recent years the author has found the Nauheim or carbonic acid baths to be of especial benefit to these cases, provided there is no irritative phenomena present. These baths are usually administered three times a week, as follows: Commence with a temperature of 94° F. for five minutes with a bath to which 200 grams of acid and alkali have been added. Lengthen the duration one minute and increase the acid and alkali 100 grams each bath until a duration of ten minutes and a strength of 500 to 600 grams of acid and alkali are reached. It will be found that these baths act in the same manner as the half bath but more rapidly.

Patients who react well, who have sufficient flesh, who are full-blooded and strong, may be given more active hydriatic procedures. My preference is for the following treatment: The incandescent electric light bath until mild, sensible perspiration ensues, followed by the circular or horizontal rain bath at a temperature of 100° to 102° F. for one and one-half minutes, pressure twenty-five to thirty pounds, and gradually reduced to 70° to 60° F. as the patient progresses. The douche, as a rule, is not generally employed, and is in many cases poorly borne, although it has been strongly recommended by Charcot. The douche, with care, may be employed, but it is a powerful stimulating procedure, calling into action nearly every physiological function; it arouses and moves to healthy action the nervous centers, deepens the respiration and increases the circulation by its local thermic massage. It may be preceded by the electric light bath. The douche can be administered at much lower temperatures, owing to

its mechanical effect, which increases the rapidity of reaction. In these cases the presence of rosy skin, full pulse, sense of well-being and increase of activity show that the proper end has been attained.

Where gastric crises exist they may oftentimes be relieved by the application of the very hot fomentation (140° F.) to the abdomen two or three times daily, followed by the trunk compress at a temperature of 70° F. for thirty to sixty minutes. Local pains may likewise be removed by the application of the very hot fomentation, followed by the compress at 70° F. or the use of the Scotch or alternating douche at a temperature of 120° F. for ten to fifteen seconds, followed by a temperature of 70° to 60° F. for three to five seconds, with four to six alternations. Paresis of the bladder is best managed by daily irrigations of hot saline or boric acid solution. Trophic changes, such as Charcot's joints, must be met by the application of the fomentation to the part once or twice daily, followed by the circular compress at a temperature of 70° F. for one hour, in addition to mechanical support, galvanism and sinusoidal electricity. General hot baths are not indicated, and should, as a rule, be avoided. Where patients are the subjects of profound toxemia we may with advantage administer the electric light bath until perspiration takes place, followed by the horizontal rain bath at 100° F. for one and one-half minutes, reduced to 70° F. for one-fourth minute, reduce temperature two degrees daily until 60° F. is reached, maintaining a pressure of twenty-five pounds. In the management of these diseases hydrotherapy becomes most effective in conjunction with other treatment, especially massage, electricity, suspension, gymnastics—the exercises commonly known as the "Fraenkel method."

The main difficulty, handicap and burden of the ataxic's life is the question of locomotion. Allow him the use of his extremities and he may lead a useful and ordinarily active life, but when he reaches the stage of canes, crutches and a constant attendant with an invalid's chair, life holds little that is bright and rosy, and just at this time he becomes most despondent, hopeless, introspective; his strength of will, fortitude and hope desert him, he resigns himself as patiently as he can to the inevitable, and awaits the release the grim monster of the hour-glass and scythe brings. The essential basic element of the exercises and gymnastics is the directing of them purposely by brain action. That is to say, these movements are performed with definite purpose and intent, the attention concentrated upon them, and by so doing the sensori-motor cortex becomes re-educated, so that the movements become easier and easier and are finally performed without conscious attention and concious will power. Fraenkel truly called them "cerebral gymnastics." These movements do not require force and power, but aim at acquiring dexterity and skill, and each endeavor must be marked by methodical and exact execution. The

patient usually commences with the simplest of movements, and as soon as these can be done well and accurately moves on to more complicated ones. Interest, snap and closely concentrated attention should mark their performance. I have seen patients who could only walk with canes and crutches much benefited and able to lay them aside after several months' exercise in combination with the treatment above outlined. These exercises are not curative of locomotor ataxia, as many seem to believe, but serve to overcome the ataxia. Contraindications are the acute cases with much pain and crises, severe arthropathy and fragile bones, and markedly run-down and anemic patients. Successful use of these exercises demands much time on the physician's part, a careful study of the patient's capacity, the ability to enthuse active co-operation and a thoroughly trained assistant and gymnasium. They should be practiced once or twice daily, but never until fatigued. As ataxia of the lower extremities is much more marked, so it is much more difficult in overcoming the upset and disordered equilibrium. I have selected and use the following exercises, which my experience has taught me to be valuable, and which have been taken from the plans of Fraenkel, Goldscheider, Leyden, Hirschberg, Dana and others, besides a few of my own added.

For Hands and Arms.

(*a*) Sit in front of a table, place hands on it, elevate fingers separately, raise hand slightly, extend and flex each finger.

(*b*) Hands on table, spread fingers, contract them.

(*c*) Dozen pennies on table, touch each one slowly with forefinger of each hand.

(*d*) Board and marbles, put marbles in holes.

(*e*) "Peg board," put pegs in holes one after another.

(*f*) Swinging balls of different sizes, oscillate, and while moving seize large balls first, smaller ones last.

For the Legs.

(A) *Bed Exercises for Legs. Patient Lying on His Back in Bed.*

(*a*) Flex leg on abdomen and make stepping movement.

(*b*) Raise leg as a whole, flex and extend fully.

(*c*) Ladder climbing, making accurate climbing and stepping movements.

(B) *Chair Exercises.*

Raise slowly from chair without aid (as soon as possible), then sit slowly.

Sitting in chair, flex legs and make stepping movement.

Raise leg as a whole, flex, then extend fully.

"Pegging," first touch round top short pegs, then flat top taller uprights.

(C) *Parallel Bar Exercises.*

Hold to bars and flex legs.

Hold to bars and walk back and forth and sideways.

Make various movements, touching spots, drawing circles, etc.

Obstacle walking.

DRILL.

(*a*) Patients walk heel and toe, body erect, soldierly attitude, a black line twelve inches wide.

(*b*) Same, walking line six inches wide.

(*c*) Same, walking on line twelve inches wide and placing foot exactly on large white transverse lines, thus giving soldier's regulation step.

(*d*) Same on line six inches wide.

(*e*) Side stepping, placing feet exactly, first on small transverse lines, then on larger.

(*f*) Side stepping, placing alternately right and left foot exactly in painted footprints.

(*g*) Foot on center dot, drawing circles with alternate limbs, especially toes.

(*h*) Walking zigzag lines, turning promptly and returning to starting point.

(*i*) "Right face" exercise, keeping on footprints.

(*j*) "Left face" exercise, keeping on footprints.

(*k*) "Setting up" movement (useful and difficult); raise legs as high as possible, flex same, bringing toe down on large transverse white line, using alternate legs and progressing along the line.

(*l*) Stand feet wide apart.

(*m*) Stand feet together, count twenty; increase until one hundred is reached.

(*n*) Advance one foot the length of small transverse white line, being other up.

(*o*) Balance on one foot.

(*p*) Obstacle walking (over different things placed on the floor, blocks of wood).

(*q*) Stair climbing.

(*r*) Stand with feet apart, hands on hips, flex limbs, stoop as low as possible, rise slowly.

(*s*) Walk backward along lines.

(*t*) Feet apart; raise arms from side until they meet above head; carry them forward and downward, bending the body until the tips of the fingers come near the floor.

(*u*) Feet apart; hands on hip, make circle with head.

The author offers herewith a schedule or plan of treatment which has proved in his hands very efficacious, and which, in conjunction with hydrotherapy, should lead to most excellent results:

First Stage—Sanatorium treatment. Rest in bed till late in the morning.

9—10 A.M. Mechanical massage, followed by rest until middle of day, either in bed, on sofa or in chair.

1—2 P.M. Hydrotherapy as per forms suggested, followed by rest.

3—4 P.M. General faradism and exercise of muscles, or galvanism to spine.

7—8 P.M. Static electricity, abundant diet, laxatives as needed, iron, quinine and strychnine tonic.

Second Stage—Gradually allow patient to get up, remaining up longer each day; add exercises gradually.

Rest in bed until after breakfast. Massage mechanical, heavy.

Hydrotherapy at midday, exercises in afternoon, static and galvanic at night (one or the other).

Third Stage—Up, going about, attending to business. During week take exercises morning and night, or at sanatorium.

Daily treatment at sanatorium: Mechanical massage followed by static electricity three times weekly; galvanic three times weekly, or mechanical massage followed by static electricity twice weekly; half bath twice weekly; galvanic twice weekly.

There is no question but what a stay in a hospital or sanatorium benefits these cases more than any form of treatment, this being oftentimes shown in cases that seek public hospitals, where the diet is meager, the milk thin, and conditions, if anything, unfavorable. *The value of hydrotherapy lies principally in its marked ability to improve nutrition.*

The disease cannot be treated by the general practitioner owing to lack of apparatus and time.

Cases must not be considered hopeless; even the most severe can be helped.

The treatment must be persisted in, not for weeks, but for months.

The sooner a tabetic becomes a philosopher about his disease and determines to earn relief, benefit and symptomatic cure, the better for him.

Until recovery has taken place the physician must exercise close supervision over the case; relaxation of treatment is nearly always followed by relapse or retrogression.

Even where the ataxia is so great as to require support in walking, or when locomotion is almost impossible, most helpful results may be obtained. I have cases that walk so well that no one could detect anything amiss.

A gain in weight, strength, nerve force and blood, together with a relief of the more or less neurasthenia and phobia that accompany the disease, may be counted upon.

Patients will also gain hope, courage and become much more content and happy, to say nothing of the comfort that return to business and work insures.

Where patients are put to bed, the plan must be followed until they gain in blood count, flesh and strength.

Improvement under this system is usually felt from the first, and varies in its rapidity, being dependent upon the intelligence, patience and persistence of the patient, his general health and the stage of the disease. The results of exercise and treatment are permanent if general health remains good. Cases of slow progress toward recovery are the best, as they tend less toward relapse, pains, etc.

False hopes of speedy cure should not be held out to the patient, but he should be made to plainly understand that, while his disease is a very grave one, he is not a hopeless sufferer; that by patient, steady and conscientious work on his part, constant supervision, direction and guidance on his physician's part, relief from suffering, amelioration of symptoms and arrest of the disease will ensue. There are, in my opinion, no class of sufferers so appreciative of relief as those now under consideration, and sympathy, patience, kindness and the best efforts of the physician should be directed toward sustaining them in the hour of their affliction. They should be imbued with that fortitude, patience and strength that are the best attributes of humanity, while receiving the most advanced and scientific treatment that the profession can afford.

The above treatment outlined for locomotor ataxia is a type of treatment suitable for all the diseases considered in this group.

Spastic spinal paralysis is believed to be of congenital origin, due to lack of development of the lateral pyramidal tracts in the spinal cord, tending to the production of sclerosis of these columns, accompanied by rigidity of the legs and arms, exaggeration of the reflexes, and some muscular weakness. Other cases are simply a form of paraplegia caused by a previous myelitis.

Ataxic paraplegia (Gowers) is an accidental form of these scleroses, affecting both the posterior and lateral columns of the spinal cord, forming part of what Dana calls "the combined scleroses," which should be classed either with locomotor ataxia, chronic myelitis or multiple sclerosis.

Friedrich's ataxia, the most common of the hereditary ataxias, is due to an hereditary lack of development in the posterior and lateral columns of the spinal cord; is characterized by ataxia beginning in the lower limbs, spreading to the other extremities, with absence of the knee jerk, no pain, anesthesia or optic atrophy, and finally terminating with contractures. There is a flattening of the cord, a sclerosis of the lateral and posterior columns and the posterior nerve roots, with some degeneration of the peripheral nerves.

Multiple sclerosis is a chronic degenerative disease, to a certain extent progressive, interrupted by remissions, and characterized by paralysis, intention tremor, nystagmus, syllabic disturbances of speech, and certain localized symptoms, depending upon the situation of the plaques of sclerosis. It is a disease of early life, more frequent in males, and nearly always follows infectious diseases; in fact, Dana states that it may be called a post-infectious disease. Nodules of sclerosis most frequently occur in the white matter, and consist of fibrous tissue with neuraxons passing through the sclerosed area. The blood-vessels are thickened, and there is increased vascularity. It destroys the myelin sheaths of the nerve fibers, the neuraxons remaining intact for a long time and conducting impulses.

CHAPTER XVIII.

FUNCTIONAL NERVOUS DISEASES.

Neurasthenia; Spinal Irritation; Nervous Dyspepsia.

The struggle for existence in America to-day has resulted in infusing into existence an intensity of life to which the nation had been a stranger until the present epoch was reached. A great deal of this can be attributed to the value attached to money and all the pleasures, benefits and emoluments that come with its possession. The strain and worry of business, the growth of social aspirations, disappointments and hollowness of this life, the nerve-racking activity of the daily press, with its sensational gossip, ghastly and sickening details of crime, murder, defalcation and suicide and political bickerings, form a constant nerve-racking state. The wonderful development of electricity, turning night into day; rapid transit, with all it means; the organization of enormous corporations or "trusts" that throttle competition, render men occupationless and homeless, and the increasing and countless numbers of victims, the results of accidents, have even developed special forms of this disease. The drift of population towards cities, with their noisy life; living in poorly ventilated and improperly lighted rooms, obtaining little sunlight and fresh air, while laboring under an intense pressure, is robbing the country of many of its best specimens of vigorous nerve force.

Neurasthenia is a chronic nervous functional disorder characterized by nervous weakness and irritability, a neurosis without organic basis (?), dependent upon nutritional change in the neuron, as a resultant of which neural energy is no longer properly stored or emitted. Men are more often affected than women. It occurs more frequently in the married, due to the heavy entailments of this life, with its many burdens and responsibilities. Neurasthenia is more a disease of the cultivated, high-strung, and of those who have reached years of fullest maturity. Indoor workers and the Hebrew are especially prone to succumb. It occurs more frequently in the city than in the country, though it is increasing in the rural population, due to their closer and more intimate connection with the outside world. Heredity plays some part, in that neuroses in parents are apt to develop in their offspring over-sensitive nerve organization. The most important exciting cause is overwork, accompanied by mental worry, strain, sorrow, fright, etc., especially in those who are untrained and unpre-

pared for work. Young men who over-study, who are working their way through college and profession under great disadvantages, frequently break down, as do young women who over-work, over-study and "do society." Traumatic conditions brought about by the fright and shock incident to serious injuries, or exposure to danger by accidents occurring during travel upon great transportation lines, have developed the "traumatic neuroses." Poisons of acute infectious disease, especially influenza, with its selective action upon the nervous system, are prone to leave in their wake many neurasthenics. The worry of syphilis, the wearing effects of anti-syphilitic treatment and excessive alcoholism produce serious forms of the disorder. Lithemia and other manifestations of the gouty and rheumatic states are no longer given prominence as causes in producing this disorder, but they follow in the same category as do eye-strain, middle-ear and pelvic diseases, acting only as agents when they have a neurotic basis upon which to build. Auto-toxemia with gastro-intestinal atony is, in the author's opinion, more often the result of the neurasthenia than a cause, but when once engendered acts in maintaining the condition and adds to the vicious cycle. Neurasthenics produce little nervous energy, discharge same easily and recharge their neurons poorly. Dana truly sums up the whole situation by saying the causes are bad heredity and foolish living.

These cases complain of intense mental depression, incapacity for mental work, lack of concentration, mental irritability, impaired memory, lack of will power and capacity, mental confusion, easily excited emotions, morbid fears and dreads, cephalic paresthesia of bands, pressure, weights, etc.; insomnia, headache, vertigo, intense physical weariness, indefinable pains, palpitations, pulsations, flushes, cold extremities; lack of appetite, indigestion, constipation, sexual irritability, weakness; their reflexes are exaggerated, flesh is lost; there is a fine tremor; the pulse is small, rapid, high tension, pupils dilated; anemia is present, and the urine, of varying specific gravity, contains oxalates, and at times urates, indican, excess of phosphates, and sometimes a transient glycosuria.

The pathology, as shown by Hodge, is that of exhaustion, characterized by a neuron body of which the nucleus is decreased in size, with irregular jagged outline, its protoplasm being shrunken. Associated with these changes are improper and irregular distribution of the blood, due to involvement of the vasomotor system, thus materially impairing the nutrition and functionating capacity of the neuron bodies.

"Complete restoration to health is possible and frequent, but a patient has to take more care of himself than before. As a result of an attack of neurasthenia, men and women who have suffered from it are apt thereafter to lead very saint-like and ascetic lives, and hence,

as a rule, live long. It used to be said by Dr. Beard that neurasthenics would have a long and happy old age. They pass through the Valley of the Shadow of Death, but the experience may be a profitable one, even though it is not a pleasant one."[1]

The treatment of the attack of neurasthenia requires a good knowledge of human nature and an unlimited fund of patience. The writer is constrained to believe that this is much more necessary than a knowledge of the physiological action of drugs. The physician who treats these cases must be so situated as to have time, inclination and facilities at command, and if he has not he should be honest enough with his patient to refuse to handle his case, and send him elsewhere. Hand in hand with the physical and bodily treatment must be found mental therapy. Kind and careful consideration, tact, justice tempered by kindness, thoughtfulness, should be so intermingled as to gain their confidence and complete docility to authority. This comes only with the long training incident to the work of the successful specialist. He may add to the store of his power by the use of physical measures that relieve the intensity of present symptoms. These agents are alone capable of relieving the disorder, but backed by the tactful physician become agents for powerful good. Neurasthenics must be encouraged and assured that they have no incurable disease, no organic trouble, and this must be told to them repeatedly. Individualization, kindness, perseverance, patience and constant striving will go a long distance, for the symptoms from which these patients suffer are not imaginary, but real. Careful examination, diagnosis, methodical care and attention to detail are indispensable.

In severe cases, those that are badly in need of fat and blood, who are sadly anemic, should be isolated from home and sympathetic friends, who suggest many things to be done and continually question symptoms and conditions. The isolation should be complete in these cases. It may be said that isolation in a small infirmary devoted to nervous disease, under the personal care and attention of a physician whose personnel will go a long distance, who has at his command every facility, offers the ideal treatment. Isolation breaks up injurious excitement, pernicious habits, queer beliefs, and in these cases should be carried out regardless of peculiarities and temperament. As soon as isolation has been secured and full treatment instituted the patient gains courage from the mere fact that some systematic method is being followed, and this "cheers him up." In passing it may be stated that persons in good circumstances recover more frequently, because they can take the treatment as it should be given. In other cases, those who are up and about and who need exercise and diversion, we may institute a partial rest cure—early to bed and late to rise, with rest after treatment and after dinner. These cases

1 Bass, C. L., "Text-Book of Nervous Diseases," 1897, p. 203.

can sometimes follow out the treatment at home by giving up a part of their occupation and duties.

The diet should be full, nutritious, and to the extent of toleration. Unless some gastric lesion is present neurasthenics must be urged to satisfy their appetite. They should drink water freely unless arteriosclerosis or cirrhotic kidney is present. Mineral waters, especially lithiated ones, are of no value—a farce other than the water they contain. Patients should ignore some of the temporary discomforts located in the stomach and eat freely. These cases are often "stomach-tube fiends," washing their stomachs upon the slightest provocation. Stomach-washing should be done by the physician himself, and only when extreme fermentation or catarrh is present. A mixed diet is best, with meat once a day, preferably at dinner, although a few pieces of crisp bacon may be allowed at breakfast. Fish and eggs form excellent articles of diet. Cereals, such as rice, sago, cracked wheat, rolled oats, shredded whole wheat; green vegetables, spinach, green and string beans, celery, lettuce, cresses; purées of peas, beans, potatoes; fruits, cooked and raw; butter freely if it does not take away the appetite; bread and beaten biscuits, toast, crackers, whole wheat, zwieback. They may drink water, milk, cream, to which plasmon may be added; milk and plasmon may be taken after treatment, and as a variant cream toast. Stimulants I do not believe in, and interdict their use. Sometimes malt extracts may be prescribed with meals, but of these I have my doubts. Coffee at breakfast and an occasional cigar are latitudes that may be indulged. Alcoholic preparations interfere seriously with digestion.

Rest is an essential feature of the treatment. Climate is not curative, the best being a warm and equable one that permits of outdoor exercise and entertainment. Climatic changes are often given the credit of curing, when rest, freedom from business cares and worry have done the work. Camping out in the woods is a good method. In winter the Riviera, Mediterranean, Bermuda and North Carolina; in summer, Michigan and Maine are excellent health resorts. Travel is useless in these cases. My experience has been that climate fills its best function as an aftermath rather than as a method of cure. Drugs *per se* are valueless, none being known that create "nerve force." Too great condemnation cannot be heaped upon testicular juice, animal extracts, be they of the goat, sheep, ox, pure or impure, nor have they added one whit to the therapy of this disease. Oftentimes it is necessary to forbid medicines, the best of which are digestants, bitter tonics, and in anæmia, Bland's mass with arsenic. Hypnotics in small doses at the start assist hydrotherapy. Local treatment to cure neurasthenia is a farce, no matter whether this be applied to the eye muscles, uterus, prostate, stomach, etc. In the general plan of treatment we should relieve these infirmi-

ties, because by so doing we are lightening the load to the weary mortal.

Hydrotherapy is by far the most important of all the physical measures used in the treatment of neurasthenia. An experience of nearly two decades has taught the author the value of this agent, and limited to one method alone for this disease he would unquestionably choose hydriatic measures. All treatment instituted for the relief and cure of the neurasthenic must be persisted in not for a day or week, but oftentimes for many weeks and even months. This is true of hydrotherapy, and in its application it should always be borne in mind that the patient must be carefully studied and his reaction developed. It is the author's opinion that neurasthenics should always be sent to a hydriatic institution, owing to the needs of complex apparatus by means of which the various forms of douche are administered, and to the further fact that those engaged in this work acquire an experience and knowledge that enable them to meet the problems that arise in every case of this disorder.

The treatment should be daily, with Sunday excepted, both on account of the advantage that comes from intermission in treatment as well as for moral and ethical reasons. In women suffering from this disorder it should be borne in mind that they have to be slowly trained to hydriatic treatment, their reaction, as a rule, being less prompt and less vigorous than that of men. Hydrotherapy makes a powerful appeal to the body and mind, by stimulating the deeper and superficial circulation: it acts upon the peripheral nerves, arousing them to healthy action, and by thousands of reflexes influences brain and spinal cord, producing tonic and sedative effects absolutely unequaled. A feeling or sense of well-being follows reaction, giving confidence to the patient. It stimulates muscular action and increases its power, removes many paresthesias, increases appetite and digestion and favors changes in metabolism.

A plan suitable for the home or for those whose reaction is poor would be the following: Dry pack for one-half to one hour, followed by a cold sponge with water at a temperature of 70° F. After a few days of this treatment give the full dry pack for thirty minutes, followed by the dripping sheet at 70° F. for three minutes, with vigorous friction. As soon as this point is reached dispense with the dry pack and give the dripping sheet at 65° F. for three minutes, with good friction, while the patient stands in a foot-tub of water as hot as can be borne. Reaction must be secured. This treatment is generally administered in the morning, and when this time is selected give the general wet pack at 65° F. for one hour at bedtime. When the patient is removed from the pack he is rapidly dried and no reaction is sought. The advantage of this method of treatment is to obtain the stimulating and tonic influences of the dripping sheet in the morning

and the sedative and sleep-producing effects of the wet pack at bedtime.

Another good method is to have the patient sit in a half bath with water at 102° to 104° F., while the attendant gives him an affusion at 80° F. to the spine, back and chest. Reduce temperature five degrees daily to 65° F. At this point the patient should stand in the tub in water as hot as can be borne while the affusion is given to the entire body, or the water is thrown with force against the body from a large dipper. This may be further modified by first immersing the body in warm water, then giving a salt rub or glow, followed by the affusion. The warm full bath (104° to 105° F.) for five or seven minutes, followed by the salt rub, and finally by the cold shower at 70° to 65° F., will be found useful. Reaction is essential.

In institutions or sanatoria many women and nearly all men may commence with the following, particularly if the case is up and going about: Electric light bath or hot-air bath until perspiration commences, followed by the circular or horizontal rain bath at 100° to 104° F. for one and one-half to two minutes, reduced to 75° F. for one-fourth minute, with a pressure of twenty pounds. Reduce the temperature two degrees daily to 60° F. and increase the pressure two pounds daily until thirty is registered. After about a week of this treatment we may add to the above the fan douche at a temperature of 60° F. to the entire body for five to ten seconds. The next move should be the following: Electric light or hot air bath until perspiration takes place, followed by the horizontal or circular rain bath at 101° to 104° F. for one minute, reduced to 60° F. for fifteen to twenty seconds, pressure thirty pounds, to be followed by the jet douche to the spine and legs at 60° F. for five seconds. An excellent method of treating these cases after reaction has been well established is to apply the jet douche to the spine at a temperature of 105° F. for a half to one minute, followed by the jet to the spine at a temperature of 60° F. for ten seconds, increasing the temperature of the hot water two degrees daily until 110° or even 120° F. is reached, at which point it will usually be found the patient can tolerate no higher temperature. This is especially useful in men who are physically strong and who complain of persistent "head feelings" and tender spine. Neurasthenics do not, as a rule, stand the Scottish douche well. Certain prominent symptoms oftentimes demand special attention.

The insomnia can best be met by the cold wet pack or dripping sheet at bedtime, or the so-called "Neptune's girdle," or trunk compress, consisting of a coarse linen bandage wring out of water at a temperature of 65° F. and covered by several layers of the same material to exclude the air. It should be worn all night. A most excellent method is the neutral bath, temperature 94° to 96° F., for twenty to sixty minutes. Simple measures that sometimes produce

sleep are the use of Chapman's ice-bag to the spine, or a hot and cold spinal sponge. In addition, we may give six to twelve ounces of warm milk on retiring, either plain or predigested.

For *headaches* and *head pressure*, the fomentation applied for five or ten minutes twice, and followed by a cold compress, is very effective. If the headache is congestive, use the hot foot-bath, followed by the ice-bag to the nape of the neck and the cold compress to the forehead. If it is a sick headache (see Migraine), wash out the stomach, administering a saline purgative through the tube, giving a hot foot-bath, followed by the cold compress to the forehead. If the headache is *persistent, indefinable* and *annoying*, it can sometimes be permanently relieved by means of the Scottish or alternate douche to the spine and legs.

"*Spinal irritation*," so-called, or the "neurasthenic spine," is best met by general douche treatment to the spine. Where this is not effective, use the Scottish douche at 120° to 125° F. for thirty seconds, followed by a temperature of 50° to 60° F. for five to ten seconds, with four alternations. Sometimes the hot and cold spinal sponge at bedtime is successful.

For *eye pains and muscae volitantes*, the fomentation to the eyes and forehead, followed by the cold compress for half an hour, repeated, if necessary, several times daily.

For *ovarian irritation and vaginal discharges*, use hot vaginal irrigation daily, or twice daily, and the hot trunk pack applied sufficiently low down to include the pelvis and hips—that is to say, to the middle of the thighs.

For *anorexia*, a glass of ice-water one hour and the ice-bag for half an hour before meals. It is astonishing sometimes what results will follow this simple treatment.

Mental depression is best met by general measures, though the neutral bath at bedtime sometimes proves very satisfactory.

For *dyspepsia nervosa* the patient must be placed upon the general treatment, although the trunk pack at a temperature of 65° F. for one hour is sometimes helpful.

Prophylaxis and the maintenance of health after recovery are best secured by a combination of factors, of which hydrotherapy is the most important. The individual should strive to lessen, as far as possible, his struggle for existence, and at the same time by perseverance and practice overcome his tendency to work. This is possible if the patient is heartily in earnest and fully appreciative of its necessity. He must fortify his neural energy at all times, especially those who have a bad hereditary basis. Those who have had an attack of neurasthenia may engage in mental and physical work freely if they learn to free their labor or occupation from anxiety, worry and fretting. Neurasthenics should carefully watch their sleep, and if at any time this

is becoming interrupted or disordered they should at once seek the advice and counsel of their medical adviser, and in this way the physician can occupy a most important domain in the prevention of a recurrence of the attack. The author has under his care at the present time a number of cases who report to him when the stress of their life or the strain of their business becomes unusual. They have learned that by such care they secure freedom and immunity from suffering, and it is his practice in these cases, should the condition demand, to institute a short course of hydrotherapy, which promptly relieves the symptoms and restores function. Among those conditions that demand immediate and proper attention are disorders of digestion; under no circumstances should they be permitted to continue, nor should the patient attempt self-treatment or medication. The prevention of neurasthenia and the maintenance of health can, as a rule, be cared for without interruption or loss of time from business, merely a temporary reduction of labor and the institution of short courses of treatment. Children should be brought up with the idea in view that they are to enter a life in which it is likely they will be subjected to the possibility of an attack of neurasthenia, and this becomes of double importance when we consider the number of children who are born neurotic, or who inherit, to say the least, sensitive nerves. These children should be educated and prepared along lines that will prevent the occurrence of this disease, and which will be found under a separate heading. (See "Rearing of the Neurotic Child.") Exercise is an excellent means of preserving health, and to this end I advise the use of the bicycle and golf. In conclusion, it may be said that there are a number of conditions resembling neurasthenia—that is to say, *neurasthenoid*—which yield to the same treatment, though much more rapidly than true neural exhaustion.

Hysteria.

The modern conception of hysteria is that of a psycho-neurosis, the underlying stratum or background of which is a profound neuro-psycopathic inheritance, the most important exciting cause being psychic trauma. The many diverse symptoms from which these cases suffer have caused the name "protean" to be applied to its symptoms. It is essentially a psychosis, due to pathological conditions as yet unknown, although probably a definite one, and characterized by hysterical attacks or "crises" and an interparoxysmal period. Specialists restrict the term to the definite manifestations of the disorder, and do not loosely apply it to all peculiar forms of nervous manifestation. It is not a disease limited to the female, nor associated with her organs of reproduction, as was once believed, but occurs in men with considerable frequency, and occasionally in children. My experience has been that the most severe cases have been in men, due to traumatic

causes. We do not see in America the severe cases that are of such common occurrence in the French and Latin nations, nor have I seen any case in my private experience equal to the ones lectured upon by Professor Charcot at the Salpetrière. We, fortunately, have the milder forms of the disease. Race predisposes, and in this respect the Hebrew furnishes the largest contingent. I have seen quite a number among Polish Jews. The disease is one of early adult life, and occurs most frequently among the poorer and richer classes, due in the former to the undermining influences of poverty, alcoholism, trauma, etc.; in the latter to the enervating influences of wealth and lack of control. Hysterical persons, as a rule, present stigmata of degeneration. The influences that incite and develop hysteria are all those conditions that bring about psychic shock—"moral traumata," as it were—and these become doubly effective where they are associated with psychic fear. For this reason railway and other accidents are frequent causes, oftentimes not from the actual injury done to physical neural structures, but to the intense shock or impression that the particular agent makes upon the hysteric's mind, already receptive by a state of suggestibility, pathologically enhanced in these persons. It is interesting to note that there is often an entire lack of proportion between the provocative agent and the results of its influence. There is in the minds of many physicians the idea that the presence of hysteria in the individual precludes organic disease. Nothing could be further from the truth, as this neurosis may be associated with or superimposed upon organic neural and physical disease. *Fear* of the direful results of onanism, or syphilis, alcohol, mercury, physical, mental and sexual excesses may so overstrain the unstable psychoneural mechanism as to produce the attack. Hysterics may present the appearance of perfect health. The symptoms affect mostly the psychic, motor, sensory and secretory systems, but are found in every function and every organ of the body. Many of the minor cases are really closely allied to those of neurasthenia, and in this country the author is rather constrained to believe that we more frequently have to deal with hystero-neurasthenia than hysteria of the pure type. Hysteria major, the grave type of the disease, is characterized by paroxysms of an emotional, convulsive character, of which the French school, and especially Charcot, have given us classic descriptions. During the interparoxysmal period we find tremors, anesthesias, paralyses, contractures and psychic conditions distinctly peculiar. This may be described as a weakening of will-power, a sensitiveness to mental and emotional influences, waywardness, capriciousness, instability of purpose, exaggeration in statements, and a morbid desire to attract attention to themselves, to elicit sympathy and condolence. Acts and movements are, as a rule, overacted. The special senses and the vegetative system sometimes present puzzling and interesting

symptoms. Dana[2] says that there are three different phases of hysteria —the hysterical temperament, hysteria minor, and hysteria major. The hysterical temperament is something with which all women and many men are naturally endowed, while in hysteria major we have much greater preponderance of stigmata and much severer forms of crises, largely of the motor type. There is no known pathological or anatomical change at the base of hysteria.

The author believes that cases of hysteria are best treated by being placed under the care of those who make a specialty of the treatment of such diseases. The management of the hysteric requires great care, thought and individualization, and it may be stated that individualization is the essential basis of success. Mental treatment and moral control are of the greatest importance, and this can be readily appreciated when we stop and reflect that this is a psychic disease. It is necessary for the physician to be in full and absolute control of the patient and the family subservient to his wishes. Give courteous and respectful consideration to her symptoms; do not run down her suffering, but with a little care and exercise of tact avoid the issue gracefully by rather leading her through innendo to believe that her symptoms are not serious, that we understand them well, and that while we do not care to minimize the impression she has of their severity, still we know them so well and have lived with them so constantly that to us they present no formidable and terrifying effects. The hysteric is like the driver who has lost the reins, and as a result cannot control the animal. It is the aim and object of treatment to place the reins within her hands, to teach her how to drive. To this end a systematic attempt should be made to cultivate the will-power, and this can be accomplished while the physical upbuilding is going on. Nothing is more difficult to convey in written language what constitutes mental and moral control, and how to exercise the "hand of steel and the glove of velvet," for these will come only with experience and careful study of cases, for no practitioner is too old or too learned not to pick up a few new items with each case that comes under his care. Moral treatment and mental control, then, include the pleasant attitude and agreeable relations that exist between patient and physician; the careful strengthening of the confidence and belief that the patient has in her medical adviser; a judicial capacity to quickly and fairly judge of the daily questions that will arise, and which cannot be foreseen; the capacity to realize the necessity for the modification of treatment and the relaxation of rules here and the exercise of indomitable firmness there; ability to talk of interesting topics, and by so doing at times ignore her wishes and symptoms and carry her far beyond her self-centered self into pleasurable realms and domains; to be a man capable of carrying a bright and interest-

2 Dana, C. L.: "Text-Book of Nervous and Mental Diseases," 1897, p. 477.

ing *bon mot* to her each and every day, and finally by constant cheerfulness, indirect and direct suggestions, assure her of recovery, and that in the interest found in her case you are her kindest friend and best adviser.

Major hysteria requires the full and complete treatment as outlined by Dr. S. Weir Mitchell,[4] and, in the author's opinion, nothing short of this will arouse the patient and bring about the cure. This treatment consists of isolation, by which the patient is removed from her home and sympathetic friends, the physician in charge having full and complete authority. Oftentimes the half-measure of isolating a case in the patient's own home is a failure, owing to its being a half-measure, and the author has long since learned by sad mistakes its valuelessness. In homely phrase, it should be "whole hog or none." The next essential is a healthy, firm, tactful nurse, fairly well educated, and interested in her patient—a rarity—for it must be remembered that for six or eight weeks these two women will be together, within the walls of one small room. The daily routine starts in the morning, on the patient's awakening, about seven or eight o'clock, with the dripping sheet at a temperature of 80° F., reduced two degrees daily to 60° F. for three minutes, with vigorous friction, while the patient stands in a tub of very hot water. Reaction is brought about by a good rub with warm Turkish towels; the patient is then returned to bed and given half to one pint of milk, either cold or hot, preferably the latter. A half to one hour later breakfast is served, and during the forenoon general massage for a half to one hour, followed by another portion of milk, to which, if the patient is much emaciated, we may add trepon or plasmon. Dinner with a malt extract, and in the afternoon general faradism to all the muscles of the body, gentle at first, in a few days strong enough to produce firm muscular contraction. This is again to be followed by another portion of milk, and later by supper with malt extract. Before bedtime the full pack at a temperature of 80° F., reduced two degrees daily to 60° F. for one hour, followed by a careful drying without much friction, and the administration of another portion of milk, constitute the daily program, which may be varied later by reading and other light occupation. As above stated, this treatment is best adapted to those cases that are bed-ridden, suffering from anorexia, emaciation, anemia and pelvic disease.

Minor hysteria requires the same tactful management. They are usually ambulatory cases, and do not require the severe measures of the major form of the disease. We may plan their treatment by first regulating the bodily functions, ordering a full diet, careful mastication of food and the free drinking of pure water. In these cases exercises are very valuable and not altogether appreciated, and the

4 Mitchell, S. Weir: "Fat and Blood," 1888.

patient should be urged to use the bicycle, play tennis or golf where there are no contraindicating symptoms. These exercises instruct and stimulate the mind, and this constitutes one of their principal values. Hydrotherapy is the best remedy, and forms an essential part of all methods of treatment of this disease. It should take front rank, for cold water acts as a powerful agent to stimulate the circulation, arouse mental action, bring about all those intricate changes of metabolism so much needed, and is, in fact, *par excellence*, the tonic and the sedative. It must be borne in mind that in all measures reaction must be secured, and that our object is to gently and gradually train the patient to take the treatment without fear. In those cases that cannot secure the benefits of institutional hydrotherapy the dry full pack for one-half hour to one hour, followed by an affusion at a temperature of 80° F. while the patient stands in a tub of hot water, will oftentimes prove of material value. The water of the affusion should be reduced two degrees daily until 60° F. is reached. In the institutional management of these cases the author begins with the electric light bath, hot air or vapor until the patient perspires, and follows this with the dripping sheet for three minutes at a temperature of 80° F., with vigorous friction, reducing the temperature two degrees daily, stopping at 60° F. As soon as this is reached a change is made to the following: Electric light bath to perspiration, followed by the horizontal or circular rain bath at a temperature of 100° to 104° F. for one and one-half to two minutes, reduced to 60° F. for one-fourth minute. This treatment may be continued a week, at the end of which time use the following: Electric light bath until free perspiration, followed by the horizontal rain bath at a temperature of 60° F. to the entire body and the jet douche at the same temperature to the spine and back of legs for ten or twenty seconds. After a short while much lower temperatures may be employed—from 50° to 45° F.—but they should be given for periods not exceeding two to five seconds and under good pressure. These cases stand the Scottish or alternating douche quite well, especially to the spine and legs, though care must be exercised to avoid sensitive areas and hysterogenetic zones, which should be protected with hot towels during its application. Administer the treatment as follows: Electric light bath until free perspiration, and as soon as this takes place apply the Scottish douche at a temperature of 105° to 110° F. for one-fourth to one-half minute, alternating with a temperature of 60° to 50° F. for two to ten seconds, three to six alternations, all under a pressure of from fifteen to thirty pounds. The Scottish douche should never be applied in this manner until we have trained our patient to stand low temperatures and considerable pressure. The best time for the administration of the douche is during the morning hours between breakfast and dinner.

There are certain excitable types of hysteria to which the above cannot be applied at the commencement of the treatment, and for these cases we employ the full wet pack at 70° F. for one hour, followed by the half bath for five minutes at 80° F., reducing the pack one degree daily to 60° F. and decreasing temperature of half bath in the same manner to 70° F. Later we may use the treatment above mentioned, exercising care and caution. After recovery the author has seen good results from the continuance of the cold hydriatic applications daily for many months, and this may consist of the affusion, cold shower or cold sponge taken by the patients daily at their homes. These cases should be urged, wherever possible, to indulge in swimming, as it is an excellent exercise, diverting to the mind, and secures at the same time the good effects of tonic cold water, and this is true in like manner of surf bathing, although the majority of cases in inland towns would be denied this pleasure. As associated treatments of great value may be mentioned faradic and static electricity, galvanism in large doses through the abdomen, and general massage.

Drugs have no place in the treatment of hysteria itself, and the use of bromides, chloral and morphine are to be most heartily condemned. For nutritional effects we may prescribe malt, iron, hypo- and glycero-phosphates.

Special symptoms arise during the course of the disease that may call for treatment, and of these *aphonia* is best met by the application of the ice-bag or throat compress and cold jet douche to the nape of the neck. The faradic current within the larynx sometimes brings about restoration.

Anorexia is best met by a glass of ice-water one hour, and, in addition, the ice-bag to the epigastrium for one-half hour, immediately before meals. In administering general treatment where these symptoms are present it is well to give the jet to the epigastrium, or where this cannot be borne a spray douche of considerable strength. Hot and cold lavage and intragastric faradization sometimes help.

Convulsions demand that the interested sympathizers be shut out of the room and a dash of cold water made to the face. Where this does not stop the attack, apomorphia, hot and cold spinal sponges and the neutral bath are the best measures.

For *contractures* we can use the fomentation, followed by the cold sponge, or, what is best, the Scottish douche. It will sometimes be found that movements and massage while in the warm full bath or very hot pack will aid in restoring them. Associated measures of assistance will be found in massage and static sparks applied to the part. Suggestion and encouragement to relax during treatment should always be carried out.

Hyperesthesia and *pain* are best met by the general treatment,

although the application of the fomentation followed by a stimulating compress or the cold affusion, douche and the Scottish douche are most useful. The author prefers the Scottish douche.

Anæmias and *parænthemia* are overcome by general methods, which consist of a heating procedure followed by the Scottish douche to the spot affected. The static spark is very effective in these cases.

Paralysis of any part should demand the application of the Scottish douche to it, at the same time urging the patient to move the part and assuring her that it is possible. Faradic electricity and massage are additional valuable methods.

Vomiting is best controlled by complete isolation and the general treatment first described.

Epilepsy.

Under the term epilepsy we consider many conditions that are, generally speaking, little appreciated, for by this term we do not simply mean a common convulsion or "fit," but states of dual personality, dreamy states of consciousness, peculiar phases of transient unconsciousness, localized or Jacksonian attacks, and lastly the well-known convulsive attacks that are the genuine or essential neurosis. It was a disease held sacred by the ancients, by many savage tribes and peoples; in fact, it often protected the individual in the same manner as did insanity. Epilepsy is almost *prima facie* evidence of degeneration, physically, neuropathically or psychopathically. It is frequently hereditary, its onset is often simply a transformation of other neuropsychic disease, alcoholism in parents forming the basis of many cases. While epilepsy may appear at *any* age, it is essentially a disease of the first two decades of life. Convulsions in infantile life should always demand careful watching and *be presumed* to be of epileptic origin, for a tendency to gloss over a convulsion exists with remarkable frequency among physicians. The attacks may commence at any age, even in the sixties. The sexes are about equally divided. The author questions seriously as to whether the exciting causes of epilepsy possess the value given to them by some writers, especially phimosis, ear and ocular troubles, but rather believes that the case would have had epilepsy anyhow, and that its excitation would have resulted from other causes equally insignificant had these not been present. In other words, the true condition is one in the cortex, latent or active, and, no matter how brought into action, it is essentially cortical, a degenerative disease, the attacks of which may be and are precipitated by external or systemic conditions, but these bear the relation of the match or fulminate to the charge proper. It is an axiom to which there is no exception that the more nearly correct and accurate we can make the epileptic's functions the better he is off, and for this reason his ocular and aural lesions must be

corrected, his teeth put in perfect condition, adenoids and enlarged tonsils removed, mouth-breathing corrected, circumcision performed, hemorrhoids removed, uterine and ovarian disease corrected, toxemias removed, but all with the very definite idea in mind that by so doing we are not treating the epilepsy *per se*, but simply removing those burdens that by their irritation are prone to cause a recurrence of the attacks and by their presence and persistence interfere with the *management of the epileptic state*. I say advisedly the management of the epileptic state, for I wish it to be understood clearly that we should not focus our mind upon the epileptic, but rather upon his state and condition, and in so doing treat him rather than his disease. Depravity of nutrition forms a basis frequently for the commencement of epilepsy, and in many other cases is an accompaniment. Of all sources for the production of attacks, the most fruitful cause has, in the author's experience, been the gastro-intestinal tract, for these cases are notoriously flagrant violators of all dietetic laws, being large, irregular, frequent and imprudent eaters, careless of kind or quality of food, self-indulgent, with appetites hard to control and seeming pertinacious desire for things known to produce their convulsions. The pathology has so far eluded the most careful search, although theories galore have been suggested. Perhaps better methods of research will reveal the lesion, though at the present time a cortical instability of the neuron bodies there located, with an easy upsetting from various toxic and other causes, is the generally accepted condition. The attacks are due to sudden explosions or discharge of nerve force, the seat of which is in the large motor neuron bodies, due probably to the weakening of the sensory control. The aura, fit and post-epileptic stages are too classic and well known to need elucidation here. Epileptics whose attacks are infrequent may live their allotted time and even do good work, though epilepsy has a tendency to shorten life. The best cases are those that occur after the twentieth year, or where the attacks are either diurnal or nocturnal.

Of all the diseases, none demands more active and prompt treatment than epilepsy, and in its management rather than in treatment lies the question of success. Cases must be treated early and vigorously managed. It may be considered axiomatic that children who have had one or more convulsions must be presumably candidates for epilepsy in later life, and for this reason the danger of the condition should be explained to the parent and the child kept under careful medical supervision, management and treatment for a period of not less than three years. Were this plan followed out, it is the confident opinion of the author that we would have fewer cases of epilepsy than at the present time, and the need for such urgent measures seems to have made but little impression upon the average medical mind. Those whose practice along certain lines has brought them intimately

in touch with epileptics and their management, learn to wonder at the tales of apparently gross neglect with cases of early and tender years. In the management of epileptics after the neurosis has fully developed, moral control enters largely, and we should exact from these cases the same obedience that is expected from the common soldier, and by so doing a wholesome respect and confidence are thereby engendered. Truth should be inculcated, for these cases have a tendency along lines that deviate from the strict rule. In the best balanced of individuals there should exist at all times a normal restraint of passions, both mental and physical, and in this respect the epileptic must be taught to never give way to angry feelings and to restrain himself at all times. Emotional states are bad, and where persisted in frequently of themselves produce attacks, and at the same time tend to loosen the hold the epileptic should at all times maintain upon himself. In like manner excitement and over-stimulation that come from the reading of exciting literature, especially "slum novels," may not only upset much that has been done for him, but may actually form the basis of post-epileptic conditions, a case of which has recently occurred in the author's practice. Temperate mental activity is favorable, for it must be understood that the epileptic's brain, like that of any other human being, tends rapidly to go to seed and to grow weeds when untended. To this end, interesting, unexciting and instructive novels, light history and books of travel may be read. Even more essential than moderate mental occupation is the industry of the body, and while we must train the mind, at the same time the hands should be educated in the arts and crafts, taking special pains to cultivate the inherited and acquired aptitudes of the individual. The epileptic is a pariah, shut out from many of the social and pleasurable intercourses of life, refused responsible mental positions on account of his incapacity, and physical occupations because of the attendant risks, danger of lawsuits, and other troubles that may arise in shops under ordinary conditions. It thus stands to reason that the mental and physical education of the epileptic is a peculiar and especial sphere of action to which men and women must be trained in order to secure proper results. In colonies, and colonies alone, can these ideal conditions of moral, mental and physical training, accompanied by the advanced methods of treatment of the disease, be found, and for this reason the author believes it is incumbent upon the State to establish for the benefit of these unfortunates an institution, farm or colony where they may learn, labor and enjoy not only existence, but the pleasure and fruits of occupation. Theoretically this is true; practically, as carried out at colonies established in the States of New York and Ohio, it is found to be correct. For more than one reason, marriage should be forbidden to the epileptic, not alone because of the canons of hard common sense, but because of the rights of unborn

generations. Not only should it be forbidden, but laws in each State in the Union should be so enacted as to make it impossible for them to marry. Physicians should cast their weight against the marriage of defectives because of its supposed value. This is a mistake, an illusion; for while it is normal to procreate, still we find that the household cares, worries and the responsibilities of the rearing of children are oftentimes burdens that it is hard for the strong and healthy to bear, let alone those who are physically, nervously and mentally incompetent, such as the epileptic. Where such an unfortunate event as marriage has been consummated, it is the author's opinion that procreation in such an event must be denied them, for it is often the case, and especially true with these individuals, that like begets like.

In the true management of the epileptic state, certain hygienic and dietetic laws must be enforced, among which may be mentioned the avoidance of tobacco, liquors, wines, coffee, tea, and the other useless luxuries that harm rather than do good. The digestion, as a rule, is weak, the appetite large, abnormal, and, as a result of the putrefactive changes taking place in the stomach and intestines, toxins are absorbed, causing frequent and recurring attacks. The food must be well masticated, cutting it up finely before starting to eat. The diet should be a mixed one, in which a small portion of meat, once daily at midday, is allowed. Green vegetables, fruits, cereals, the limitation of starchy food and sugar, should be insisted upon. The author mentions to condemn the habit of eating candy between meals, and has noticed in one or two cases improvement from stopping its use. At times benefit is derived by a few days of milk diet alone. Plenty of water should be drunk between meals, and, where gastric disturbances are great, a tumbler of hot water in which ten grains of bicarbonate of soda has been dissolved may be taken before breakfast. Golfing is a most excellent exercise for out of doors, walking next; indoors the punching-bag is a suitable form for these cases. While the exercise may be active and sufficient to stimulate the circulation of the blood, it should be just short of fatigue. Amusements in cases where attacks are not frequent may embrace the theater, provided the attendance is at a matinee and that the melodrama is avoided. Sleep must be secured in large amounts, and to this there is no exception. The author believes that the method of treatment to be adopted in these cases consists of the administration of the bromide of soda or strontium night and morning, well diluted with water, to the extent of forty or sixty grains daily, with the use of tonics and digestants given after meals. The combined treatment —mental, moral, physical, hygienic, dietetic, medicinal and hydrotherapeutic—is essential, and the utilization of only one or two parts of the plan usually results in failure to benefit. Hydrotherapy is

now universally acknowledged to form an essential part of the system here laid down. With a little ingenuity it can oftentimes be administered at home. Home treatment may commence with the sponge bath daily at a temperature of 90° F., reducing daily two degrees F. until 70° F. reached. This should be followed by rapid friction with a rough Turkish towel. As soon as the patient is accustomed to this procedure we may give the warm full bath at 100° F. for five or ten minutes, following same by an affusion at a temperature of 65° F., or with a rapid cold sponge and hard friction with a dry Turkish towel.

An excellent procedure for home treatment that the author can recommend is the use of the salt glow or rub until the skin is well reddened, followed by the warm full bath, cold sponge or affusion and friction as above described. It is really astonishing how rapidly patients improve under this treatment. Another method that can be used in the home is the half bath at a temperature of 85° to 80° F. for five to ten minutes, accompanied by friction, finishing the treatment with an affusion at 60° F. to the spine. These procedures can be carried out in almost any farmhouse or city residence where even a moderate degree of intelligence exists, but it has been the author's sad experience that the treatment is pursued with enthusiasm and care for only a very short time. This is another reason why colonies and sanatoria secure better results, pursuing their treatment, as they do, carefully, persistently and painstakingly. In institutions the proper method is to commence with a sweating procedure, such as the electric light bath, hot air, superheated dry hot air or vapor, followed by a tonic method. The author prefers the electric light bath until perspiration has taken place, followed by the horizontal or circular rain bath at a temperature of 100° F. for one to one and one half minutes, pressure twenty to thirty pounds. Reduce temperature one degree daily until 65° F. is reached. At this point we may, in addition to the foregoing, administer a jet douche to the spine and legs for one-fourth to one-third minute at a temperature of 65° F., under pressure of twenty-five to thirty pounds. All other diseases that are present must be treated, especially malaria, rheumatism, gout and syphilis.

To sum up, we may say that in the management of the epileptic we should exercise perfect control; arrange his mental, moral and physical activities; have him avoid nervous excitement, irritation and exhaustion; grant him rational occupation and amusement; insist upon a simple, abstemious dietary, free water-drinking, abundance of sleep, ample outdoor exercise, regulation of all bodily functions, the intelligent administration of bromides, and, finally, painstaking and persistent hydrotherapy, associated with massage and electricity where indicated.

Chorea.

Chorea, or "St. Vitus' dance," is a functional neurosis characterized by irregular jerkings and inco-ordinate movements, occurring during the later periods of childhood, most often between five years and puberty, more common in girls than in boys, and being present most frequently in the spring. The Hebrew and German races are especially prone to the disease. The movements vary in intensity from slight, careless, irregular twitchings of co-ordinate groups of muscles to violent jerkings, writhings and contortions. The child winks, screws up its face, drops things, stumbles and jerks. Speech is thick, eating and dressing become difficult. Rheumatism bears a close etiological relation to chorea, and endocarditis occurs in the course of the disease with considerable frequency. Infectious diseases, overstudy, worry, anemia, malnutrition, all seem to be predisposing causes. Important factors in the production of the attack are fright, worry and emotional disturbances, these being the most frequent in the author's cases. Excitement makes the movements worse; physical exertion likewise increases them. There is no pain, anesthesia or suffering, though the mental processes are slowed and the child somewhat apathetic. Cases relapse with a fair degree of frequency, especially about the vernal and autumnal equinoxes. The pathology is that of an intense hyperemia—dilatation of the blood-vessels, small hemorrhages located in the gray matter of cortex, basal ganglia and spinal cord. The meninges and pyramidal tracts are often involved. The interruption of the involuntary impulses by diseased foci causes the irregular movements. In general terms, it may be said that there is a neurosic instability brought about by the action of some toxin upon the higher nerve centers. The prognosis as to death and recovery is excellent, death hardly ever occurring (none in the author's cases) and recovery being the rule. The disease lasts from six weeks to six months. Two cases have recovered in the author's practice after three and four years' continuous duration.

In the treatment of chorea the child should be at once removed from school, and freedom from excitement, worry and annoyance secured. The writer is constrained to believe that a number of his cases of chorea have been brought about by the over-strain that resulted from the competition for the prizes of school life. Rest is one of the essential factors, if not the *sine qua non*, in the treatment of the disease, and where the jerkings are severe it must be complete and in bed. The diet must be full and generous, and the ordinary meals supplemented with milk, tropon, plasmon, etc. Copious water-drinking is insisted upon to secure active secretions. The author's plan of treating these cases, and against which he has yet to record a failure where it was maintained for any reasonable length of time, is

the following: The child is kept quiet and at rest, if necessary in bed; Fowler's solution of arsenic in rapidly increasing doses is administered, the diet corrected, and hydrotherapy instituted. If the twitchings and jerkings are severe the child should be placed in a neutral bath at a temperature of 96° F. and kept there for one or two hours. This will be a difficult task unless we have some one who will stay by the bath-tub and entertain the patient by means of miniature sail-boats and other aquatic toys which can easily be purchased. Other cases are placed at once upon a dripping sheet in the morning at a temperature of 90° F. for three minutes, with vigorous friction, followed by the use of dry hot Turkish towels until reaction is secured. The temperature of the sheet may be dropped two degrees daily until 70° F. or even 60° F., in the case of larger children, is reached. In the evening we may employ the general wet pack at a temperature of 70° F. for three-quarters to one hour, followed by a rapid cold sponge or alcohol rub, finally drying the patient with warm Turkish towels and securing good reaction. In the institutional management of chorea we may employ the electric light or hot-air bath until perspiration takes place, followed by the horizontal or circular rain bath at a temperature of 100° F. for one minute, under fifteen to twenty pounds' pressure, and reduced to 70° or even 60° F. The writer has administered this temperature successfully to children of the age of five years. In older cases we may, in the place of or after the horizontal rain bath, employ the spray douche to the entire body at a temperature of 70° F. for one-fourth to one-third minute, under pressure of fifteen or twenty pounds, gradually reducing the temperature daily to 60° F. and increasing the pressure to thirty pounds. Some authors advise the use of sweating procedures, such as hot air for ten to twenty minutes, followed by the full dry pack for thirty minutes and a subsequent rest of one hour. The writer's experience has not been satisfactory with this method of treatment. Cardiac complications do not contraindicate hydrotherapy, but such cases are usually benefited by its use. In cases where endocarditis exists the precordial compress or ice-bag should be employed. As associated methods we frequently find general massage and central galvanization of brain and spine of considerable value. A trip to the country or sea-shore and surf-bathing form an excellent finish to such cases. Mineral waters, internally seem to possess no value, although some authorities recommend the external use of the waters of the hot springs of Virginia, Arkansas, and Las Vegas, New Mexico.

Exophthalmic Goitre.

Exophthalmic goitre, Graves' or Basedow's disease, is a chronic neurosis of the sympathetic nervous system, characterized by tachycardia, enlargement of the thyroid gland, protrusion of the eyeballs,

nervous irritability and exhaustion, muscular tremor and marked vasomotor symptoms. The disease occurs most frequently in females, my private record showing a ratio of six to one. It occurs most frequently in women between the ages of fifteen and thirty-five years—that is to say, the period of greatest reproduction and fecundity. It occurs equally among the married and unmarried, but is more frequent in neuropathic families and individuals. The immediate causes that are likely to precipitate this neurosis are anything that puts emotional strain upon the nervous system, such as fright, worry, grief, and prolonged anxiety. At present the action of these factors in its production is unknown. The secretion of the thyroid gland is increased and probably altered. The essential symptoms are: (1) Increased heart-beat and pulsating arteries, the pulse-beat ranging from 120 to 200 per minute, the arteries being soft and dilated, attacks of palpitation occurring frequently; (2) the thyroid gland is enlarged and a thrill or bruit felt; and (3) the exophthalmos is usually pronounced, bilateral, with pupils normal. A fine vibratory tremor, nervousness, insomnia, diarrhea, sweating, and lessened electrical resistance are usually present. Partial or abortive cases occur in which there are increased heart-beat, goitre, tremor, sweating and nervousness, these being frequently mistaken for neurasthenia. Nervous complications frequently occur, especially hysterical attacks.

The real pathology is unknown, but the author accepts its nerve origin, as a result of which an excess of secretion from the thyroid gland is thrown into the circulation, causing the symptoms. It is believed that nerve tissues require a certain amount of thyroid secretion for their natural functionation. The goitre and exophthalmos are due to the vasomotor paresis, and the rapid heart beat to impairment of the inhibitory fibers of the spinal accessory nerve.

The author has very definite and fixed ideas concerning the treatment of exophthalmic goitre. His experience has been that the dispensary or ambulatory treatment of these cases is most unsatisfactory, and that results that are satisfactory are rarely obtained. *Per contra*, he has found that the sanatorium or hospital management has produced excellent results, often in cases that had previously tried many accepted methods of treatment.

The prime factor in the treatment of this disease is to secure the patient's hearty co-operation and a sufficient length of time in which to accomplish the work, and unless these are secured the treatment might as well be given up, as otherwise failure is ahead. The time required for proper sanatorium treatment ranges from four to six months.

The first thing to do is to secure, as far as possible, perfect rest. By this is meant that the patient is put to bed and kept there, on her back, without getting up, for one or two months. It means freedom from worry and excitement, absence from household cares, husband,

children, and the vexing servant problem; a highly nutritious mixed diet, sufficiently nitrogenized—that is to say, three meals daily, with milk, plasmon or kumyss between meals. Green vegetables should be eaten and water freely drunk. No alcohol, tea, coffee or tobacco is allowed. Flesh and fat must be put on; unless the weight is increased the patient is not improving. The author has definite, fixed ideas with regard to the value of the drugs usually recommended in this neurosis, viz., belladonna, strophanthus, sparteine, bromides, etc. For temporary non-curative use they occasionally fill the bill; as ultimately influencing recovery their value is nil. I have never seen any good from animal extracts, thyroidectin or the serum of thyroidectomized goats, although it has been given careful trial. Potassium permanganate tablets of one grain each, coated so as to dissolve only in the intestinal tract, are sometimes useful as an intestinal antiseptic. Surgery has entered the field and obtained some good results, but the high death-rate of 12 to 20 per cent. makes us hesitate until all other means have been duly tried. This does not apply to surgical work in the removal of intranasal and pharyngeal growths, the removal of which has in several cases been beneficial to patients. Two remedies are of unquestioned and permanent value—hydrotherapy and galvanism.

In the treatment of these cases by hydrotherapy, we may divide them into the rest and the ambulatory stages. For the sake of clearness, the author will describe the daily treatment of such a case. The patient, in bed with proper diet and surroundings, receives immediately after breakfast an application of the galvanic current. Two hours later the ice-bag is applied over the heart for twenty to thirty minutes, over the thyroid gland for twenty minutes; dinner in the middle of the day, followed by a second treatment by galvanism, three hours later very gentle massage is administered, followed by the application of the ice-bag to the heart and thyroid gland; supper is eaten and at bedtime the ice-bag is again applied over the heart and gland. At the end of approximately three to four weeks we commence the use of the dripping sheet before breakfast at a temperature of 90° F. for three minutes, with the patient standing in a foot-tub of hot water; be sure to secure satisfactory reaction. At the start the circulation may be somewhat perturbed, but this subsides in a few days, especially when the temperature of the sheet, which is reduced two degrees daily to 65° F., reaches the colder temperatures. Some time during the day the physician should administer the lighter and simpler movements of the Schott system of graduated exercises. After about five or six weeks the patient begins to get up for short periods during the day, which are gradually lengthened. At the end of about eight weeks the patient is able to take full and complete treatment.

Full treatment in these cases consists in the application of the galvanic current, usually after breakfast, and the administration of the hydrotherapeutic prescription at about ten or eleven o'clock. Electric light bath so that the patient barely perspires; horizontal rain bath at a temperature of 100° F. for one and one-half minutes, pressure fifteen pounds, reduced to 65° F. for ten seconds, this in turn being followed by the jet douche to the spine and legs at the same pressure and temperature, for ten seconds. The douche is kept rapidly moving. The pressure should be gradually and daily increased until thirty to thirty-five pounds is reached. Reaction having been secured, the patient retires to bed, and an ice-bag is placed over the heart and thyroid gland as heretofore, remaining in bed until dinner time. During the afternoon general massage is given, followed by the ice-bag; after supper static electricity, and finally, at bedtime, the ice-bag again. Where improvement continues this treatment is kept up for several months, galvanism, ice-bag, massage and hydrotherapy being gradually withdrawn in the order named. Coincident with this, the patient is allowed to drive out, take short walks and gradually resume her place in the social world.

There are, however, some cases that do not do well under the use of the horizontal rain bath and douche, and these are best met by the Nauheim or carbon dioxide bath treatment. The preliminary period of such treatment will oftentimes enable the physician to employ the douche. The author has found Dana's method of using galvanism best. Climate and mineral waters possess no value as therapeutic agents. Should these cases go to the sea-shore, even after complete recovery, they should never indulge in surf-bathing, as it is too violent. Many writers have advised the use of the full wet pack as preferable to the douche, but this has not been the author's experience. Patients are finally cautioned never to allow themselves to "run down," and where they notice a recurrence of any of the prominent symptoms to immediately return for a six to eight weeks' course of treatment. The author has had half a dozen cases to so relapse and immediately improve on the institution of the treatment along the lines already laid down.

Headache.

If printer's ink is to be taken as the criterion of the needs of a country or community, if its extent and persistency are any indication as to the wants of the inhabitants, then certainly there is to-day among the people of America abundant evidence of the prevalence and persistence of cranial pain. Wherever we turn and wherever we go, we are confronted with the glaring poster or colored card, indicating to the passing eye the relief of a symptom that must be so common and so frequent as to have impressed its importance and its needs

upon the superficial and casual observance of the populace. From another standpoint it evidences a certain futility in the medication of head pains.

In *organic headaches* the therapeutic field is of necessity much narrowed, and the results obtained are usually unsatisfactory and more or less euthanasic. Generally speaking, the organic headache is constant, with variations from slight to extreme and severe paroxysms, the pain rarely intermits, and becomes so prominent as to prevent sleep.

Meningeal headache may occur in two forms—the acute, or that form present during the acute inflammatory stages of the disease, and a chronic headache brought about by the changed or thickened condition of the meninges. In the acute headache we must at once, and as far as possible, remove all causal agents and adjacent foci of irritation, secure absolute quiet in a darkened room, and nutritious liquid food without stimulants. The hair is to be cut close, and an ice-bag, coil-cap or Leiter's tube made use of while we are administering such medicinal treatment as is demanded by the case. In the chronic form medicines seem to be totally without value, with possibly the exception of iodide of potash, and in this condition relief is best obtained by the use of hydrotherapy.

Traumatic headache, or head pain occurring after blows, concussions, after laceration of the brain substance, and after surgical operations, is usually severe and lasts a long time. It need not be circumscribed or limited to a region corresponding to the site of the injury, but in my experience it has rather tended to be diffuse than circumscribed. Prominently associated with headache are vertigo, lassitude and indisposition to mental effort. After a little while the head structure seems to take on a sensitive state and become appreciative of very slight causes that are provocative of pain. Of all *organic* headaches that I have to treat, this form has yielded the best results.

Arterio-sclerotic headaches, occurring in the early stages of the disease, can be, as a rule, very materially benefited and influenced by the treatment suggested for this disease. These headaches are produced by changes in the walls of the small vessels (endarteritis), are influenced by soluble and diffusible poisons circulating through the structures that are ageing; later the headaches are accentuated by the gradual closure of the small vessels.

Functional headache is really one of the commonest ailments to which the American of to-day is subject, and it spares neither man, woman nor child, but occurs in twice as great frequency in the female. Probably owing to the high pressure under which the urbanite lives, together with the fact that he is closely confined in ill-lighted and poorly-ventilated rooms, we find that he suffers much more frequently

than the suburbanite who tills the soil and lives in freer and purer atmosphere.

The duration of headaches is as variable as the winds themselves, ranging from a few hours to many years. There are very few individuals that escape headache during their lifetime; many only suffer when "bilious," or when the alimentary canal has become clogged and inactive. The pain may be continuous or paroxysmal. The pain of headache is nearly always diffuse, and is generally described as being deep-seated; the pain is probably caused by irritations located or referred to the peripheral ends of the fifth or twelfth nerves, whose terminations are found in the dura mater.

It is largely through the blood-vascular system that we have to look for the changes that are productive of this disorder, and it is probable that the excellent results achieved by the use of hydrotherapeutical remedies have been due to the fact that they act largely through this system, and favor elimination, purification and reconstruction of the vital circulating fluid. Poisons circulating in the blood, elaborated during the growth of pathogenic micro-organisms, many of which we are unacquainted with; that group of toxic products developed in the many and multiple changes that occur during the chemism of tissue metabolism; imperfect retrograde changes, not eliminated, but retained through imperfect excretion—all may act in producing cranial pain. These cases usually refuse to yield to symptomatic or medicinal treatment, but yield brilliant results to hydrotherapy.

Sometimes the mere removal of the cause of the headache is far from sufficient, although we are so taught by many authorities that the removal of the cause is all that is necessary to produce a satisfactory cure of the case. It is a beautiful theory but far from the facts of practice. He who is gifted with the ability to discern and remove the causal factors has found to his sorrow that it does not relieve, for it seems that certain "habits of pain" become established, become points of least resistance, are easily upset by any slight cause or causes acting upon these structures. I would say that in laying down the general routine of treatment of all functional headaches, we should proceed as follows:

By a careful, painstaking examination and analysis arrive, if possible, at the causal features, which we will proceed, of course, to correct. Then remove any and all burdens that might, through their transferred or reflex action, increase or accentuate the local symptoms, such burdens being prominently found in the eye, the gastro-intestinal tract, the uterus, etc. Next regulate the hygienic surroundings of the patient, attending with especial care to the cloaca maxima; remove such toxic problems as tobacco, alcohol, coffee or tea; regulate work; prevent overwork; enjoin a proper dietary, sufficient exercise, and, as

far as possible, such mental treatment as will tend to prevent constant recollection of the pain.

As a rule, the hydriatist never sees a case of headache until it has become chronically fixed and the patient has "tried" a number of physicians and a multitude of remedies, adopting them in a hit-or-miss fashion, or "in hopes of its doing him some good"; so it is always well to remind such cases that chronic headaches require more or less chronic treatment.

The treatment of headache should be along two lines—the meeting of the causal indications and localized conditions that exist in the case, and up-building of the general nerve and nutritional state of the patient. Careful and persistent regulation of the cloaca maxima is the rule practically in all cases, the treatment of which has been dwelt upon heretofore (see Constipation).

It has always appeared to the author that there is a reasonable and rational explanation of why in headaches hydrotherapy should be superior to any method. Headaches being produced largely through the instrumentality of the blood circulation, any method that can control this activity, favor elimination and produce changes in metabolism, is an agent for vast good. No remedy that the author is aware of so thoroughly and perfectly meets the requirements as hydrotherapy, and he has for a long number of years depended largely upon it for the relief of head pain.

The general or nutritional treatment of headache should have for its object the toning or "equalizing" of the circulation; increase of oxygenation; elimination of toxins and the waste products of metabolism; the elevation of depreciated nervous tone; the increase of neural strength; the absorption of any existing inflammation; the betterment of the appetite, digestion and assimilation; and in hydrotherapy we find a single measure fitted to accomplish the entire work. These cases are, as a rule, never confined to bed, and for that reason we may start with a rather full treatment. In weak, delicate and anemic patients commence by giving the electric light bath or the hot-air bath until the surface of the body is thoroughly warm, and *before* perspiration takes place remove from the bath and give either a rapid cold sponge at 70° F. or the dripping sheet at 80° F. for three minutes, with vigorous friction, reduced two degrees daily to 70° F. If the case, however, is fairly strong, we may use the electric light bath until perspiration takes place or until the skin surface is well warmed. If it is desired to put on flesh the patient should be allowed to perspire but slightly. Upon removal from this bath we give the horizontal or circular rain bath at 100° to 104° F. for one or two minutes, twenty pounds pressure, reduced to 80° for one-fourth minute, followed by a rapid drying and sufficient friction to secure a good reaction. Reduce the temperature two degrees daily to 65° F. and in-

crease the pressure one pound daily until thirty pounds is reached. Patients, as a rule, begin to show improvement after ten to fifteen treatments. The aim, however, is to reach the higher stimulation that is obtained by the application of the jet douche, and as soon as improvement takes place and reaction is well established give the following treatment: Electric light bath until moderate perspiration; rain bath at 100° to 104° F. for one and a half minutes, thirty pounds pressure; reduced to 65° F. for one-fourth minute, followed by spray or fan douche at 65° F., twenty pounds pressure, to the body for ten seconds and the jet douche to the spine and posterior aspect of the lower limbs for ten seconds, paying especial attention to the cervical region, and being careful to terminate the jet on the lower spine and limbs. The effect of such treatment is far-reaching and satisfactory; all the secretions and excretions are stimulated, and under its influence tissue change takes place. The functional activity of those organs that have been threatened and crippled are given a physiological lift, as it were, and through the lightening of the burden resume their former proper action, with the result that permanent improvement is obtained. The nervous system is much impressed, owing to the manifold reflex effects that arise from the thermic irritation.

Certain forms of headache demand special treatment. The localized treatment of nearly all headaches, especially those due to troubles arising from the eye, ear, nose, throat or teeth, and the supraorbital, temporal and cervico-occipital, are best met by the application of the fomentation over the painful parts, followed by the cephalic compress, the use of the hot foot-bath, the half pack at 120° F. for one hour, or the warm full bath at 100° F. for twenty minutes.

Anemic headaches may oftentimes be relieved by applying the cephalic compress wrung out of water at 120° to 130° F., or by the application of the fomentations at the same temperature to the painful part. At the same time the Chapman's double-column hot-water bag may be applied to the neck or over the cervical cord, the patient reclining in bed with the head low. The general treatment is valuable in these cases, and at the same time must be borne in mind the treatment for anemia.

Hyperemic headaches require rest, elevation of the head and shoulders, and heat to the extremities. The very hot foot-bath or the half pack at temperature of 65° F. for one hour, together with the application of the cephalic compress at a temperature of 60° F., repeated as often as it becomes hot, or the coil-cap or ice-bag over the cephalic compress. Sometimes the throat compress, in addition to the bath, will give prompt relief. In these cases the Scottish or alternating douche to the spine and legs is most excellent.

Toxic headaches, where due to tobacco, alcohol, tea, coffee or other poisons, demand first cessation of the intake; profuse sweating meas-

ures, followed by a general cold tonic treatment, especially the douche. Copious drinks of pure, alkaline or carbonated waters, to which, if lead is the cause of the headache, the iodides may be added in small doses. The same treatment is advisable where the headaches are caused by an excess of acids, oxalates, urea, purin bodies, or any waste material due to decomposition and absorbed from the alimentary canal or thrown into the circulation through defective metabolism. Where the toxic headache is due to derangement in the stomach, intestine or colon, gastric lavage to cleanse the stomach of foul or fermenting food, followed by antiseptic irrigation, the moderate use of the enema and the treatment of constipation, in addition to the general management, will prove effective. Where marked atony or splanchnoptosis is present, the abdominal supporter, the abdominal pack at 65° F. for several hours, Neptune's girdle worn during the night, abdominal massage, the sinusoidal current to the abdominal muscles and the Scottish or alternating douche to the spine and the abdominal wall, will in many instances bring about recovery.

Reflex headaches, dependent upon ocular, nasal, auditory, pelvic, sexual or other irritations, demand the removal of the cause and such local treatment as the individual condition indicates, with the general nutritional treatment above outlined.

Neuropathic headaches arising in the course of neurasthenia, hysteria, epilepsy, neuritis and other affections demand no special treatment save that of the disease itself, which has been thoroughly considered under the sections named.

Organic headaches, where due to arterio-sclerosis, syphilis, meningitis and other causes, should be treated as indicated under the particular disease acting as the causal agent. These headaches are oftentimes modified by the application of the very hot compress to the head over the painful part, followed by the cephalic compress. This treatment may be repeated every two or three hours until relief is given.

In like manner the diathetic states of gout, rheumatism, diabetes, uremia, must be met by measures calculated to relieve the disease itself.

In all cases of headache rest is found to be advisable, not only during the attack, but in the interparoxysmal period. It should form a part of every plan. Certain medicines can be used for temporary relief, although they have no curative or permanent value, among which may be mentioned the bromides, gelsemium, cannabis indica, caffeine, phenacetine, etc.

Migraine.

Migraine, hemicrania, sick or nervous headache, is a neurosis whose most characteristic symptom is a paroxysmal headache, usually

confined to one-half of the head in the region of the fifth nerve. The attack of pain or ache is usually closely associated with mental depression, nausea, vomiting, intolerance of light, sensitiveness to sound, vertigo, pallor and flushing of the face, tinnitus aurium, incapability of mental action, and some prostration. It is a very frequent disease, occurring more often in women and developing usually about the period of puberty. It excepts no profession or calling, but selects its sufferers from all walks of life. The wage-earner, the brain-worker, the scientist, the statesman and physician are not spared. It occurs in neurotic families, and seems to bear a close relationship to epilepsy; in fact, some authors are inclined to believe that this is likewise a degenerative neurosis. The exciting causes are usually those of overwork, both bodily and mental, loss of sleep, shock and trauma, digestive disorders, acute auto-toxemia, etc. Continuous poisoning from the digestive tract and refractive disorders of the eye are often agents that tend to keep up as well as bring on attacks. The attacks are irregular and occur most frequently in winter. They usually last from six to twenty-four hours, sometimes two or three days. The disease seems to lessen after the fourth decade, both in men and women, especially so in the latter after the menopause. It may sometimes be associated with epilepsy and various other neural manifestations. Its pathology is that of a fulminating neurosis, with periodical nerve storms occurring along the intracranial branches of the fifth and pneumogastric nerves, without anatomical basis, its seat being probably the cerebral cortex, the attacks being precipitated by some auto-toxic agent.

Treatment resolves itself into that of the attack and the interparoxysmal period. When called to see a case of migraine it will generally be found that the patient has voluntarily sought rest and quiet in a darkened room, as far as possible from noise and interruption. We should forbid at once any food whatever during the existence of the attack, and proceed to use lavage, washing the stomach out thoroughly with plain warm water or warm saline and finishing the wash by leaving within the stomach a dose of an alkaline cathartic. Sometimes it is necessary to precede or follow this by a hot soapsuds enema, though in a great many cases this is not necessary. The patient should be urged to drink freely and frequently some carbonated water, the most satisfactory of which is Vichy or seltzer in glass syphons. Much relief and abatement of pain will be secured from a hot foot-bath for ten or fifteen minutes, commencing with a temperature of 104° or 105° F. and rapidly adding hot water until 115° to 125° F. has been attained, administered with the patient reclining across the bed. This is to be followed by a fomentation to the head over the seat of pain, applying same as hot as can be borne for a period of ten minutes, followed by a compress or ice-bag to the affected re-

gion. In conjunction with this we may administer certain coal-tar preparations where the pain is severe.

The treatment of the interval has for its object the upbuilding of nerve tone, general health, and the maintenance of nutrition, removing all causes, be they auto-toxic or reflex. With this in view we should correct visual disorders under cycloplegia; remove nose and ear abnormalities; correct uterine, ovarian and stomach disorders, with the distinct idea in view of relieving the burden of their existence upon the already handicapped patient. Children in whose families migraine runs should have their eyes examined before the development of the disease. Careful regulation of the diet with the object of preventing putrefaction and the formation of purins, toxins, etc., is best accomplished by avoiding tea, coffee, tobacco, alcohol and malt liquors, and eating red meats in small quantities. Green vegetables, cooked cereals, dry bread, potatoes, beans, corn, peas, tomatoes, asparagus, spinach, lettuce, eggs, fish and fowl form a good dietary, for the digestion must be such as to maintain nutrition and prevent toxemia. The writer is of the opinion that too great care cannot be exercised to overcome the existing constipation, and to this end the treatment heretofore mentioned should be used, embracing hydrotherapy, massage and the sinusoidal current. Salines must be avoided, as they deplete the system and by their too free osmosis interfere with nutrition. Equanimity of mind, the avoidance of mental and physical strain, the constant practice to secure an even disposition, the leading of a quiet and regular life, the avoidance of anxiety, worry, late hours, crowded rooms, and all excesses, will go a long way toward preventing the recurrence of attacks. Daily exercise of from one to two hours in the open air, walking, golfing, bicycling or driving, is advantageous. These cases should secure nine to ten hours' sleep nightly. Climate is of no value, and treatment is too frequently neglected, although it deserves the same care and thoughtfulness as the other severe neuroses. Children of migrainous parents should have their health kept perfect, their education carefully arranged to prevent over-strain, and otherwise reared as the neurotic child should be. Hydrotherapy possesses great value in these cases, because its action is to increase vitality and neural force, favor elimination, prevent attacks, and by its admirable tonic and reflex action upon the vasomotor centers and nerves prevent many of the conditions that incite and perpetuate the attacks as well as the disease itself.

A plan suitable for the home or for those whose reaction is poor would be the following: Dry pack for half to one hour, followed by a cold sponge with water at a temperature of 70° F. After a few days of this treatment give the dry full pack for thirty minutes, followed by the dripping sheet at 70° F. for three minutes, with vigorous friction. As soon as this point is reached dispense with the dry

pack and give the dripping sheet at 65° F. for three minutes, with good friction, while the patient stands in a foot-tub of water as hot as can be borne. Reaction must be secured. This treatment is generally administered in the morning, and when this time is selected, give the general wet pack at 65° F. for one hour at bedtime. When the patient is removed from the pack he is rapidly dried and no reaction is sought. The advantage of this method of treatment is to obtain the stimulating and tonic influences of the dripping sheet in the morning and the sedative and sleep-producing effects of the wet pack at bedtime.

Another good method is to have the patient at first sit in a half bath with water at 102° to 104° F., while the attendant gives him an affusion at 80° F. to the spine, back and chest. Reduce temperature five degrees daily to 65° F. At this point the patient should stand in the tub in water as hot as can be borne, while the affusion is given to the entire body or the water is thrown with force against the body from a large dipper. This may be further modified by first immersing the body in warm water, then giving a salt rub or glow followed by the affusion. The warm full bath at 104° to 103° F. for five or seven minutes, followed by the salt rub and finally by the cold shower at 70° to 65° F., will be found useful. Reaction is essential.

As vital processes are most powerfully influenced by the douche, and as these cases are, as a rule, up and going about, we may, after laying down the laws by which they are to govern their life, and insisting upon free water-drinking, commence a course of hydrotherapeutics with the administration of some sweating procedure, the best by far of which is the electric light bath until free perspiration takes place, followed by a horizontal or circular rain bath at a temperature of 104° F. for two minutes, reduced to 70° F. for one-fourth minute, reducing the temperature two degrees daily until 60° F. is reached. At this point we should add the jet douche to the above treatment at a temperature of 60° F. for five or ten seconds to the spine and posterior aspect of the legs. In robust persons the author has found the following excellent: Electric light bath until free perspiration; horizontal or circular rain bath, temperature 104° F. for one minute, followed by the jet douche to the spine and legs at 110° F., gradually increasing to 115° to 120° F. for one-half to one minute, rapidly reduced to 60° F. for five to ten seconds, applied to the spine and posterior part of the legs only. In some cases it will be found that the neutral bath at a temperature of 94° to 96° F. for twenty to sixty minutes will oftentimes prove of service, and will sometimes prevent the occurrence of the attack that is threatened, although the author's experience has been that should an intimation of the attack be present it is wisest to institute at once

the methods suggested for the treatment of the attack itself. By this method of management migraine has been successfully cured, provided the treatment was kept up for several months.

Insomnia.

The necessity for sleep, and the intimate and important relation it bears to the preservation of health and even life itself, surround the study of its phenomena, in health and disease, with an interest second to nothing that I can recall. For ages philosophers, physiologists and clinicians have vied with one another in endeavoring to solve its intricate problems, and to-day in insomnia we are confronted with a condition that begins to assume gigantic proportions.

The ever-growing importance of a knowledge of how to preserve normal, healthy sleep, and how to relieve sleeplessness, becomes apparent to the most superficial of observers. Our daily life is one of wear and tear, whether it be at the desk or in the counting-house, before the bar of justice or at the bedside, upon some pleasure expedition or in arduous toil. A glance at a Rubens, a Raphael or a Venus de Milo consumes our cerebral force, and not a second of the time is the brain inactive while awake. Thus every act or thought, every object viewed, every sound heard, is a tax upon the nervous system.

Work calls in turn for repose. The nervous system rests only during sleep, and it needs no further demonstration that sound and healthful sleep is essential to the well-being of every individual. The more we work the greater the need of sleep. The mind can resist the need of sleep only up to a certain point. Soldiers fall asleep in the saddle, and the writer remembers his total inability to resist the sleepy feeling stealing over him on a long and trying ride in Colorado—in fact, does not remember anything that occurred during the last few miles of the ride.

Sleep is usually brought about by a diminution of irritability caused by fatigue of a large area of the cerebral cortex. In addition, owing to relaxation of the vasomotor tone, lowering of arterial blood-pressure, and lessened demand, less blood is sent to the brain. There is present a cyclic tendency to rest, and this is aided by the voluntary withdrawal of physical, sensory and mental stimuli involved in going to bed. This condition is favorable for the repair of brain tissue. The full and true mechanism of sleep is not yet understood.

The respiration and heart-beat are slower, due to lessened medullary innervation. The salivary, urinary and conjunctival secretions are less active. The special senses of sight, taste, smell, hearing and touch are lost.

The onset of sleep is gradual; a delicious feeling of languor, a drooping of the eyelid, the unsocial but truth-telling yawn, are the pleasant forerunners of approaching sleep. Upon retiring, in a short

time we experience a feeling of inward supineness, enervation and torpor; the limbs, head and back partake of this general feeling, and assume a position of relaxation and comfort.

The physical phenomena of sleep are many. The sensorium, both special and common, becomes incapable of recognizing external impressions. That most wonderful attribute, the will, is abolished; judgment, reason and perception are greatly weakened, while the emotions and imagination are retained—memory only partially. The nervous system is quiescent, its many and diverse functions curtailed; reflex action less active, and the medullary centers of respiration and circulation slackened.

Thus the work of the economy is carried on at the lowest expenditure of energy; its fires are banked, its tell-tales are shut off, its machinery still.

Insomnia is a loss of sleep, either in duration or depth. It is a serious symptom, and should indicate to the physician the necessity for a careful inquiry into the patient's condition. Insomnia may originate from an incidental cause, and in its turn become a cause of grave diseases of the nervous system. There are cases that contract a habit of sleeplessness. It is a vigilance in the cerebral cells, initiated and maintained by a perturbing element. I know of no condition, unless it be that of constant pain, that causes its victims so much misery as insomnia. Sleep ranks as a co-equal with food in the preservation of life, and many a man's power of work is in proportion to his ability to sleep.

The causes of insomnia are many. The aged are less likely to sleep; the nervous temperament, intellectual pursuits, especially in the evening or night; worry, anxiety, fretting and bodily pain are all potent causes in preventing sleep. Some persons are by heredity good sleepers, others bad. Even excess of light noises of any kind is unfavorable. I know, however, of no cause so potent for the production of this symptom as overwork. Constant strain and work produce an imperfect vasomotor innervation, and dilatation of the blood-vessels follows upon the slightest provocation. Neurasthenia is nearly always accompanied by, and frequently causes, this trouble. Gout, rheumatism, lithemia and dyspepsia are potent agents. Anemia may be a cause as well as a result of the disorder; while in shock, hysteria and hypochondriasis this symptom is always a prominent one.

Toxic agents, such as the poisons of malaria and syphilis, tobacco, cocaine, alcohol, chloral and morphine, often underlie persistent and intractable insomnia.

Reflection leads one to a cause more potent than I have mentioned previously—the age in which we live.

The American is naturally a quick, active, nervous individual, and the nervous diathesis is the prevailing diathesis of this country. He

has a narrow margin of force, and is always on the edge of "nervous bankruptcy." He is never so happy as when whirled in his "vestibuled limited" at sixty miles per hour. We rarely rest reasonably, and even when taking recreation we feel we need that wonderful factor in the production of nervousness—the daily press! Think of the tax put upon an already busy man by being brought in daily contact with the actions of governments, at home and abroad, and compelled to study the fluctuations of far-distant markets; the excitement incident to the change of political parties; the constant change of laws and new legislation! In the morning paper, read at breakfast, we find the sorrows of the world, its joys and its disappointments, and a nature but moderately sympathetic is consciously or unconsciously robbed of its nerve force daily, and sometimes twice daily, by this indefatigable power. Thus our mode of life and civilization, the varied uses of steam and electricity, higher education and scientific study, the excitement of religious revivals and of the social question, are all contributing to make us a nation of nervous people, and wherever nervousness is found insomnia invariably follows in its wake like the shark.

In the treatment of insomnia hygiene is important. The room should be cool and contain plenty of fresh air. Ventilation is best secured from above; noises and light avoided. The last meal of the day should be taken at least three hours before bedtime. Diet should be varied, nicely cooked and appetizingly served. The clothing should be light and warm. A careful inquiry into the daily work and a regulation of the hours becomes a duty. Rest during the day—a nap after dinner of say twenty or thirty minutes, or simply reclining on a sofa—is beneficial. Golf, horseback riding, gymnastics, cycling, walking, lawn-tennis, bowling—all have their place and uses. Alcohol, coffee and tobacco should be used in extreme moderation, or, what is better, interdicted completely. The grave responsibility of suggesting a sufficient quantity of alcohol or malt liquors to produce sleep, and the dangers of forming a habit from such a prescription, is not to be forgotten. Morphine must never be used for the relief of insomnia. Hypnotics are two-edged swords, and it has always been a question with me whether the good they do is not offset by the harm they cause.

It were well for all to remember that "no man can gain time by stealing it from sleep."

Climate is of some advantage in the treatment of insomnia. The sea-shore and long sea voyages have a tendency, by their improvement of nerve tone and general restfulness, to induce sleep. This is true when the voyage or stay at the sea-shore is not attended by storms. The New Jersey coast, Cape May and Atlantic City, are the best. In summer the Great Lakes, Maine, especially Kennebunk-

port, California, Bermuda, Egypt, etc., bear excellent reputations. Warm milk or infant's food at bedtime is valuable. The ideal hypnotic is hydrotherapy.

The best plan to be used in the treatment of insomnia is a general treatment that has for its object the toning of the nervous system, the favoring of elimination and reconstruction of the general health, at the same time increasing appetite, digestion and assimilation. This is best accomplished by the conjoint use of the electric light bath until perspiration is induced, followed by the horizontal or circular rain bath for two minutes at a temperature of 100° F., rapidly reduced to 80° F. for one-fourth minute, pressure twenty-five pounds. Decrease temperature two degrees to 65° and increase pressure one pound daily until thirty is registered. When this point is reached finish the treatment by applying the jet douche to the spine at 65° for ten seconds, up and down the posterior aspect of the limbs for ten seconds. Where there is much digestive disturbances we may also include a mild fan douche to the epigastrium and abdomen. In applying the cold jet to the spine, limbs and epigastrium the total time should not be over fifteen to twenty seconds, and the column of water must be kept rapidly moving.

Of all the measures that are used to produce sleep the full wet pack is by far the best. We may commence the pack in delicate patients with a temperature of 90° F. and a duration of thirty minutes, applying same at bedtime. The temperature of the pack and the duration may be changed rapidly in the course of a week, say dropping five degrees in temperature and increasing the duration five minutes nightly until we have reached a temperature of 60° F. and a duration of one hour. Care should be exercised to keep the ice-cap on the head during its application. *It is very important to note that no secondary reaction is demanded upon the removal of the patient from the pack.* The patient should be dried, the night-dress gotten on as quickly as possible, quiet enjoined, a glass of hot milk given and sleep sought. Many patients sleep during the application of the pack, and where this is the case it may be noted that its maximum good is being accomplished. It must be borne in mind that this treatment can be applied in any home in the land, and for that reason its use should become universal. It is an interesting fact that by means of hydrotherapy sleep may be induced by infinitesimal doses of the ordinary hypnotics.

The next best measure is the neutral bath at a temperature of 94° F. for forty minutes. Commence the first night with a temperature of 96° to 98° F. and a duration of fifteen minutes, dropping the temperature one degree nightly and increasing the duration ten minutes until a temperature of 94° F. and a duration of forty and even sixty minutes is reached. Care should be taken that the hair

does not become wet, and that the patient, as far as possible, remains quietly in the bath. He should be rapidly dried, avoiding everything that would tend to cause a coryza, retiring to bed promptly, taking hot food, and, if necessary, a small dose of hypnotic, though this latter is usually dropped after a short time.

A minor measure that has frequently produced sleep in mild cases of insomnia is an alternate hot and cold sponge to the spine. This will oftentimes allay the cerebral congestion and irritability, and thus place the patient suffering from the simpler forms of insomnia in an excellent position to sleep. Chapman's ice-bags applied from the mid-dorsal to the sacral vertebræ and kept in position for one hour nightly has in some cases relieved the condition when other measures failed. Continental physicians are very fond of the use of the brief cold sitz bath at a temperature of 70° to 80° F. for two to five minutes just before retiring. The prolongation of the bath beyond five minutes will have the reverse effect and produce wakefulness. It is therefore better to err on the side of brevity.

The trunk compress or Neptune's girdle applied at a temperature of 65° F. and worn all night will relieve some cases, especially where we have to deal with gastro-intestinal diseases or where there is irritability of the sympathetic nerve in the abdomen. Insomnia brought about by excessive, irregular, and over-acting heart will oftentimes be benefited, comfort given, and psychic relief brought about by the application of the ice-bag to the precordium. Where insomnia is accompanied by coldness of the lower extremities the foot-bath at a temperature of 40° to 50° F. for a half to one minute at bedtime may be found of possible use. A local wet pack may be employed in these cases by wetting a pair of stockings in water at 60° to 50° F. and covering them with dry ones. They should be worn all night.

Associated measures of considerable value are general massage, static electricity and cerebral galvanization.

A most excellent plan in the conduct of a case of insomnia is to first remove, as far as possible, causal factors; institute the proper hygiene, diet and exercise; general tonic hydrotherapy for reconstructive and sedative effects during the morning and the administration at bedtime of one of the hydriatic hypnotics, and, should it be necessary, in conjunction with this treatment small doses of one of the well-known medicinal remedies of this nature. Special attention should be paid to auto-intoxication, digestive disorders, constipation and nervous irritability.

Vertigo; Tinnitus Aurii; Tinnitus Cerebri.

These disorders are grouped because they are affections that have a similarity of cause and treatment, and are often associated together.

Vertigo is a disturbance of the sense of equilibrium characterized by apparent movements of external objects or the person himself. It is a most common disorder, usually dependent upon some other condition or disease—a symptom, though at times it appears causeless, possibly a pure neurosis. It is usually due to some irritation of the space-sense portion of the eighth cranial nerve—that is to say, the nerve of Cyon—the lesion or disturbance being believed to be in and around the semicircular canals. Mendel claims it is due to functional disturbance of the ganglion cells of the ocular nuclei, and is conditioned by the circulation. The disorder is frequently accompanied by nausea, depression and sometimes vomiting.

Vertigo is, as a rule, terrifying. The subjective disturbances of consciousness make patients realize their apparent helplessness; it comes on suddenly, and, while it lasts but a moment, the ideas become confused, the patient upset, and an endeavor made to grasp near objects. It is sometimes so severe that the patient falls. It is increased by sudden movements and relieved by lying down.

Impulses flow into the central nervous system from the semicircular canals and ampullæ through the vermis to the cerebellum; others from the eye and its governing muscles; from the viscera, muscles and joints; they constitute our communication with the world and external objects by means of which we are able to maintain equilibrium. These impulses are, as a rule, uninterrupted and continuous, and anything that tends to break or disturb this flow of impulses or interferes with the precortical appreciation of same will produce disturbances of equilibrium—that is, vertigo.

The *prognosis* of the organic variety depends upon the causal disease. Menière's disease may be helped while deafness is progressing. The prognosis of the vertigo of neuroses is generally good, while that of ordinary vertigo is excellent.

The treatment resolves itself into that of the attack and the chronic state. During the attack the horizontal position should be continually sought, the clothing loosened, and volatile stimulants administered; if indigestion be present, the stomach washed; if the heart is weak, the ice-bag applied to the precordium. As soon as the attack has subsided endeavor should be made to find its cause and the condition treated. If we have to deal with a vertigo in which the heart and circulation are at fault, nothing will give such good results as the institution of the full Schott method of carbon dioxide baths and graduated exercises; if it is toxic, tobacco, alcohol, coffee and tea should be forbidden. The diet must be adapted to the condition that the gastric analysis has shown to be present.

The general measures we may adopt in the treatment of vertigo should commence with the full dry pack until the skin is warm, which usually requires twenty to thirty minutes, this to be followed by the

cold sponge at a temperature of 80° F., reducing two degrees daily to 60° F.

A plan suitable for the home or for those whose reaction is poor would be the following: Dry pack for half to one hour, followed by cold sponge with water at a temperature of 70° F. After a few days of this treatment give the dry full pack for thirty minutes, followed by the dripping sheet at 70° F. for three minutes, with vigorous friction. As soon as this point is reached dispense with the dry pack and give the dripping sheet at 65° F. for three minutes, with good friction, while the patient stands in a foot-tub of water as hot as can be borne. Reaction must be secured. This treatment is generally administered in the morning, and when this time is selected give the general wet pack at 65° F. for one hour at bedtime. When the patient is removed from the pack he is rapidly dried and no reaction is sought. The advantage of this method of treatment is to obtain the stimulating and tonic influences of the dripping sheet in the morning and the sedative and sleep-producing effects of the wet pack at bedtime.

Another good method is to have the patient at first sit in a half bath with water at 102° to 104° F., while the attendant gives him an affusion at 80° F. to the spine, back and chest. Reduce temperature five degrees daily to 65° F. At this point the patient should stand in the tub in water as hot as can be borne while the affusion is given to the entire body or the water is thrown with force against the body from a large dipper. This may be further modified by first immersing the body in the warm water, then giving a salt rub or glow, followed by the affusion. The warm full bath at 104° to 105° F. for five or seven minutes, followed by the salt rub and finally by the cold shower at 70° to 65° F. will be found useful. Reaction is essential.

Reaction will by this time be active, and the next mentioned treatment may be then employed. Many cases may be started on this treatment who have ordinary fair reaction. Electric light bath, hot-air bath or superheated dry hot air body apparatus until perspiration takes place. Horizontal or circular rain bath at a temperature of 100° F. for one and one-half minutes, reduced to 60° F. for ten to fifteen seconds, twenty-five pounds' pressure. After five or six treatments of this character have been administered we may give the following: Electric light bath to the point of free perspiration, followed by the circular or horizontal rain bath at 103° F. for one and one-half minutes, rapidly reduced to 60° F., pressure twenty-five pounds, for five to ten seconds, followed by the fan douche to the body and the jet douche to the spine at 60° F., pressure twenty to thirty pounds, for five to ten seconds. Where this treatment is applied the attendant will have to move quickly so that the patient will

not become chilled between the administration of the rain bath and the douche.

Where we have to deal with much gastro-intestinal disturbance we may modify the treatment with the following: Electric light bath to free perspiration; circular or horizontal rain bath at 104° F. for one and one-half minutes, rapidly reduced to 60° F. for ten seconds, pressure twenty-five pounds, followed by a strong fan douche to the abdominal walls and the jet douche to the spine for a period not to exceed five to ten seconds. This is a powerful treatment, and care must be taken in its application. Some cases will be found much benefited by the use of the trunk compress or "Neptune's girdle" at a temperature of 65° F. for one hour. Where it is possible, the patient should take the general treatment heretofore mentioned, as it is more successful.

Sea-sickness.

Nausithia, or *mal de mer*, is the name applied to a definite group of symptoms that occur usually in persons on board a vessel at sea, occasionally when the subject is in a rapidly moving railway, trolley, elevator, swing or merry-go-round, and in which nausea and vomiting are the most marked phenomena. Young children are very little affected, the lower animals frequently so. The symptoms vary from uncomfortableness to mental and physical collapse, and are characterized by disgust for food, nausea, obstinate vomiting, by chilliness, pallor of the face and lips, headache, soreness in the back, neuralgic pains in the extremities, mental depression, despondency, and a general lack of mental capacity. The skin is pale, cold, clammy; the urine diminished, the pulse small, feeble and easily compressed. Its cause is supposed to be a disturbance or rupture of labyrinthine compensation affecting the space-sense of the eighth nerve. Mechanical concussion of the nerve elements, auto-intoxication, lowered vascular tone and morbid suggestion certainly influence in some cases.

Treatment.—Hydrotherapy should form an important element in the prophylaxis and treatment of the disease. The use of calomel and salines, together with enemas of normal saline solution, for a week before sailing will be found advantageous. Those contemplating a trip across the ocean may commence with a cold sponge night and morning at 70° F., reduce three degrees each application to 50° F. After three days' use of this method we may employ the hot full bath at 104° F. for five minutes, followed by the salt rub, the treatment being terminated by the use of the shower at 60° F. for one-fourth minute. Both of these treatments should be followed by vigorous friction with a crash towel. Those who have access to institutional methods should immediately be placed upon the electric light bath to full perspiration, followed by the rain bath at 102° F. for one

minute, reduced to 70° F. for one-fourth minute. Give treatment daily and reduce the cold water five degrees each treatment to 60° to 55° F. At the end of the three days, in addition to the foregoing, the cold jet should be applied up and down the spine and over the posterior aspects of the lower limbs for ten to fifteen seconds. It is astonishing how quickly the vasomotor system and space-sense can be affected by these measures. Upon going aboard ship the very susceptible should discontinue the use of tonic cold hydrotherapy heretofore suggested, and spend as much time as possible on deck in the fresh air, reclining in a steamer chair. From some personal observation, and from its use in cases of nausea and vomiting from other causes as well as sea-sickness, the writer can state that the use of the Chapman spinal ice-bag will be found of very great service in the management of these cases, increasing as it does the vascular tone by stimulation of the spinal centers. It can be used aboard ship while the patient reclines upon deck. Another excellent method is the fomentation applied to the epigastrium at a temperature of 130° to 140° F. for ten minutes, repeated for ten minutes and followed by the ice-bag over the epigastrium for thirty to sixty minutes. The abdominal compress, trunk pack or Neptune's girdle will be found serviceable in certain cases.

Yeman[1] says that he has employed the hot full dry pack to the entire body, including the head, and found it of great value. He continues its use until the superficial blood-vessels are fully dilated.

Eugene Wolf, a noted German traveler, has found the use of hot towels to the head efficacious.

Occupation Neurosis; Professional Neurosis; Fatigue Neurosis; Writers' and Other "Cramps."

Occupation neurosis or functional fatigue neurosis is characterized by a spasmodic, tremulous, paralytic or painful disturbance, coming on when the movements are attempted, the parts becoming rapidly fatigued when their use is continued.

The essential causation of the disorder is the constant repetition of certain muscular movements which, by strain and overuse of certain groups, give rise to muscular disturbances. The condition is usually manifested by spasm, pain, weakness and tremor in varying degree and combination. This is true, whether the affection be writer's cramp, seamstresses' spasm, telegraphers' cramp, or any other of the many now well-recognized varieties. The more highly organized the function, the more intricately and delicately balanced the movements, the more readily does the part take on fatigue and inhibition. There have been no pathological findings in these cases. The most common forms in my experience have been writers' and telegra-

[1] Yeman, H. W., Journal American Medical Association, December 21, 1895.

phers' cramp, and these, or one of them, will serve as a type for the rest.

Writers' cramp dates from 1820, when steel pens were introduced, and was much more common during the earlier years of their use than later, when the "American method" of writing came into vogue. This method consists of the use of the forearm muscles as a fulcrum and the upper arm and shoulder muscles as the moving factor. It is essentially the free and open style of writing. These disorders occur more frequently in men than women, and are especially prone to attack the clerical force. It is usually found between the ages of twenty and forty, between which ages clerks are most likely to have a great deal of writing to do. Rapidity of writing, improper handling of the pen or telegraph key, have a tendency to produce the disorder. The predisposing causes are intemperance and other debilitating diseases. In a few cases injury has produced the disorder.

The onset, as a rule, is slow and insidious, commencing with a discomfort and stiffening in the parts affected. After a short while fatigue, pain and soreness take place upon the use of the hand. This condition may last for years, but gradually grows worse with time; the parts begin to ache, feel numb, weak, cramped and tremulous. Rest and rubbing temporarily ease the condition. Gradually less and less use and more frequent attacks, which may by this time have grown so violent as to throw the objects from the hand or fingers, or the muscles may slowly open the hand in painful spasm. Hand-writing grows from bad to worse; the grip on the key is quickly released, although sufferers resort to many and various devices to overcome their debility. New pens and holders are used, new places are selected to press the key, but finally their use becomes impossible and the hand refuses to write or press the lever. If a change is made to the other hand, in a short while it becomes involved.

Cramps are the most common, next the painful form. The author has never seen a case of the paralytic variety, although German authors speak frequently of its occurrence. Patients suffering from this disorder are generally nervously run down, anemic—in fact, neurasthenical.

Of the pathology of the disorder little is known. The author has always felt that the discoveries of Hodge gave a clear idea of what is likely the condition of the centers affected. It will be recalled that Hodge, examining the neuron bodies, found that after fatigue certain changes took place. These changes were ascribed to the use of the part. It seems likely that we have to deal here with the same condition as exhaustion or fatigue followed by a true fatigue neurosis. The lesion certainly must be central, and involves probably the gray matter of the cerebral cortex and the afferent and efferent paths. In some cases a myositis, a neuro-myositis, or at times a true neuritis is present

The disorder is a chronic one, and to ordinary treatment incurable. The painful form is the best to treat, and the presence of a peripheral origin makes for a better chance of recovery. The best method of treatment usually cannot be followed out, owing to the fact that clerks and operators cannot afford the time nor the expense to take the rational and needed rest and treatment. They usually "hang on" until they are compelled to give up their positions and occupations. The author has systematized his treatment of these cases into the use of hydrotherapy to tone up the general health, massage to overcome the muscular spasm, and static electricity for its general tonic and local effects.

A plan suitable for the home or for those whose reaction is poor, would be the following: Dry pack for half to one hour, followed by a cold sponge with water at a temperature of 70° F. After a few days of this treatment give the full dry pack for thirty minutes, followed by the dripping sheet at 70° F. for three minutes, with vigorous friction. As soon as this point is reached, dispense with the dry pack and give the dripping sheet at 65° F. for three minutes, with good friction, while the patient stands in a foot tub of water as hot as can be borne. Reaction must be secured. This treatment is generally administered in the morning, and when this time is selected give the general wet pack at 65° F. for one hour at bedtime. When the patient is removed from the pack he is rapidly dried and no reaction is sought. The advantage of this method of treatment is to obtain the stimulating and tonic influences of the dripping sheet in the morning and the sedative and sleep-producing effects of the wet pack at bedtime.

Another good method is to have the patient at first sit in a hot bath with water at 102° to 104° F., while the attendant gives him an affusion at 80° F. to the spine, back and chest. Reduce temperature five degrees daily to 65° F. At this point the patient should stand in the tub in water as hot as can be borne while the affusion is given to the entire body, or the water is thrown with force against the body from a large dipper. This may be further modified by first immersing the body in the warm water, then giving a salt rub or glow, followed by the affusion. The warm full bath at 104° to 105° F. for five to seven minutes, followed by the salt rub and finally by the cold water shower at 70° to 65° F., will be found useful. Reaction is essential.

Hydrotherapy may be applied daily in these cases, in the shape of the electric light bath, hot-air or vapor bath until free perspiration, followed by the horizontal or circular rain bath at 100° F., reduced to 65° F., pressure twenty-five pounds. Massage or vibration should be applied in these cases, both generally and locally. The static treatment employed is that of heavy sparks to the spine and over the arm and hand: the hand is placed in the position in which it is most used,

and static sparks applied to muscular groups to produce contractions; after this the wave current is given over the hand and arm for ten minutes. Rest from use and occupation can materially aid these cases in getting well. Where this treatment has been persistently followed out the author can record some of the most satisfactory results in his professional experience, but it is useless to commence the treatment when it cannot be persisted in for a number of months.

Paralysis Agitans; Parkinson's Disease; Shaking Palsy.

Paralysis agitans is a chronic progressive disease, without definite pathological anatomy, characterized by tremor, muscular rigidity and weakness, causing a peculiar attitude, gait, vasomotor phenomena and restlessness. The disease occurs in the period of late maturity, from the fiftieth to the seventieth year, and where cases occur under this age limit we are apt to find symptoms of pre-senility. Males are much more frequently affected than females, the disease occurring in all classes and stations of life. Observers have noted that the Irish are more frequently affected with this disease, Americans next, and then follow the Jews of Poland and Russia. Heredity is rare, though at times we find indirect heredity which does not account for the disease. It is not found in those who are the subjects of syphilis, alcoholism or vice, in this respect differing from many other diseases. In like manner no occupation, and neither an active nor sedentary life, predispose. Worry, anxiety, and prolonged hard labor have been said to be the predisposing causes of the affection. Of causes that directly excite the disease may be mentioned fright and injury. These become doubly active where we have psychic shock superadded to physical trauma. Its development is insidious, usually being preceded by a sense of weariness for a variable length of time, after which it may be observed that a fine tremor has developed in one extremity, for the disease usually starts upon one side, most frequently the right, gradually passing to and affecting the other side. Later rigidity and the peculiar facies develop — immobile, expressionless, wooden. The body becomes bowed, with slight flexion of the extremities, which give the individual an appearance of being aged. The gait is shuffling, the speech is slow, the voice piping. "His big manly voice changed to childish treble." The vasomotor phenomena in the shape of heat, flushing, burning, redness of the face, similar to that of the drunkard, make their appearance. In spite of the gravity of his trouble, the patient is, as a rule, non-emotional, a striking characteristic of the disease—an euthanasia, as it were. The course of the disease is usually progressive, and its history closed by exhaustion or some intercurrent disease. The symptoms are increased by physical and emotional excitement. Dana[1] says: "The post-mortem

[1] Dana, C. L., "Text-Book of Nervous Diseases," 1897.

changes are not very marked, and are seen mostly in the spinal cord and medulla—the congestion and dilatation of the vessels in the gray matter, and diffuse increase of interstitial tissue, atrophy and pigmentation of cells. The process is suggestive of chronic interstitial inflammation with cell degeneration. It is probably a post-infectious process, with toxins behind it. The cerebro-spinal motor neuron is the most at fault, and it has seemed as if the connection between its end-brush and the motor cells of the spinal cord were interfered with, hence the peculiar 'hold-ups,' the rigidity and tremor of the disease. Paralysis agitans is certainly not merely a premature senility, as some have taught."

Treatment resolves itself into the endeavor to stay the progress of the disease, to make the patient comfortable and prolong life. There is no question but what rest, physical and mental, is a most valuable agent in the treatment of this disease, and this is especially true where treatment is instituted between the periods of rest. Plenty of fresh air is beneficial, no climate having been found that would seem in the least degree to influence the disease. Diet must be adapted to the case in hand, but should be plain, simple, nourishing, care being taken to have the food well cut up in order that we may increase the digestive capacity and prevent disorders of this kind. My own observation has been that treatment along this line—that is to say, the correction of errors of digestion—has done much to make the patient comfortable and stay the progress of the disease. From a fair though limited experience the author is satisfied that medicines are of little value, neither changing the course of the disease nor curing it, sometimes making the patient more comfortable. The most serviceable ones are the digestants, laxatives, codeine and extract of pituitary gland. The three things that my experience has taught me to be most helpful in paralysis agitans are hydrotherapy, massage and exercises. These should be combined into a system of treatment.

Most cases suffering from paralysis agitans do not, as a rule, react well from the application of cold water, and for that reason they should be *gradually* trained to stand moderately cold temperatures. Where the case is very much run down, or in the home, we may commence the treatment with the full dry blanket pack for twenty to thirty minutes, followed by the cold sponge at a temperature of 85° F., repeated daily, lowering the temperature one or two degrees each treatment until 65° F. is reached. By this time we may begin the use of the electric light bath until the patient just begins to perspire, this to be followed by the horizontal or circular rain bath at 100° F. for one minute, reduced to 65° F. for ten seconds, pressure twenty pounds. *Reaction must be secured.* The writer has found that these cases do not respond well to the hot air, superheated dry hot air or Turkish bath. They should, as a rule, be given the douche, or even the

rain bath under a heavy pressure. It will, however, be found that where judicious and careful applications of hydrotherapy are made the patient's elimination will increase, his digestion improve, flesh be put on and the vasomotor phenomena that trouble him so greatly benefited. In some cases the tremor and rigidity are benefited by the use of the neutral bath at a temperature of 94° F. for twenty to thirty minutes, followed by rest for one hour in bed or upon the sofa.

Massage and mechanical vibration are of unquestioned value in relieving some of the disagreeable symptoms and increasing the general nutritional effect. They should be general in character, not continuing to the point of causing fatigue, especial attention being given to the abdominal contents, with a view of increasing digestion and overcoming the constipation. Exercises will be found of great value in these cases. The best movements are those of passive over-extension, followed by extreme contraction. This of itself will overcome a good deal of the tension of the muscles. These movements must perforce be given by the physician himself, or some one well trained in the administration of therapeutic exercises. The administration of the passive exercise should be followed by a training in the exercises of precision, or what is commonly known as Frenkel's method, the details of which have been mentioned in another section. These exercises should be gradually increased until the patient takes the full and complete set.

Sanatoria offer special advantages in these cases, and, in fact, many of them would prolong their life in comfort and pleasure could they live within the walls of some well-regulated institution. Under the constant, careful and custodial care of the physician and nurse, together with the regular mode of life of such institutions, with the freedom from care, strife and excitement, we are able to alleviate their sufferings, make them more comfortable, and, as before mentioned, increase their span of existence materially. Those who have observed carefully their hospital experiences have learned to know that though probably general hospitals offer but poor facilities in the way of diet, treatment care and attention for these cases, still striking improvement is often noted after a reasonable sojourn within their wards.

The keynote of success is to maintain the general nutrition, overcome the various symptoms and increase tone.

Facial Spasm; Mimic Tic; Spasmodic Torticollis; Wryneck; Spasmodic Tics; Habit Spasm.

Facial spasm, mimic tic or habit spasm is a disease characterized by an involuntary, intermittent, quick twitching of the facial muscles, unaccompanied by pain or paralysis. This may occur as a closure of the eyelids (blepharospasm), movements of the mouth and nose,

sucking or smacking movements of the lips, sometimes as a movement of the lateral face muscles, and often accompanied by head and neck movements from subsequent involvement. The spasm subsides during sleep and is lessened by repose. It may last for years. The movements are ordinarily quick and lightning-like, usually quickly repeated from several to many times. Later on in the disease the spasm may become at times tonic. The majority of my cases have occurred in youth and early adult life. Some authors state that women are more frequently affected than men, though my personal experience has been that they were equally divided. Emotion, fright, worry or injury may cause an attack, and these conditions always increase and aggravate the existing spasm; likewise excitement, embarrassment and emotion. Some authors state that it is often reflex, from irritation of the different branches of the trigeminal nerve, though I have never seen a case so caused. Generally a neuropathic constitution underlies the disease, the pathology of which is unknown, believed by some to be a psycho-neurosis and by others a degenerative condition. No known anatomical changes have been discovered. Life is never endangered by the disease; a guarded prognosis should always be given.

The author has had what he considers to be most excellent results in the treatment of facial spasm, having cured seven out of eight cases. To succeed we must have sufficient time, ten to twelve months, in order to bring about the general and local change that means a cessation of the jerkings. The plan adopted has been as follows: The patient is placed upon a partial rest schedule and given the following treatment: Being up and about we may commence with the electric light bath or superheated dry hot-air bath until mild perspiration takes place, at the end of two or three treatments increasing their duration until profuse perspiration takes place. The patient is removed to the horizontal or circular rain bath at temperature of 102° F. for one minute, reduced to 80° F. for one-fourth minute, pressure twenty pounds. Reaction is secured, and after this he is wrapped in a sheet and reclines upon a lounge. The bath attendant now applies the fomentation wrung unusually dry to the affected muscles, and if the spasm has extended to adjacent groups it is applied over these. Two fomentations are applied, and as a finishing treatment the area is rapidly sponged with water at a temperature of 60° F. As soon as the patient's reaction is well established we should rapidly drop the temperature of the cold water until 60° or even 50° F. is administered for ten or fifteen seconds. When this point has been reached add to the above treatment the jet douche to the spine at 60° F. for five to ten seconds, thirty pounds' pressure, taking special care to have the patient hold the head back and giving all the percussory force possible over the cervical spine and occiput. These cases must reach

the most powerful treatment possible before good results can be expected.

This is given in the morning daily, and in the afternoon or evening a galvanic current is applied to the muscles affected as follows: A compress is wrung out of hot water containing bicarbonate of soda and applied over the affected muscles. Over this a large electrode attached to the positive pole of the galvanic current is placed, the negative pole of which is applied to the nape of the neck. Five to twenty milliamperes for three to seven minutes is then administered.

If complicating troubles—reflex irritations, diseases of the genito-urinary system or pelvic disease—are present they should be corrected, a proper dietary instituted and the treatment persisted in. Internally the author uses fluid extract of gelsemium or atropine hypodermically. In this manner he has been able to cure permanently some of the most stubborn cases of the disease. Permanently is stated advisedly, as some of his cases have gone fourteen, thirteen, eleven, and eight years without relapses.

Spasmodic torticollis or wryneck is an irritative lesion of the spinal accessory nerve, characterized by tonic or clonic spasms of the muscles supplied by this nerve. The disease is prone to spread and involve the muscles supplied by other nerves, especially the cervical. As a result of the action of these muscles the face is carried forward, turned to the opposite side, tilted upward, and at the same time drawn backward. The sterno-cleido-mastoid and trapezius muscles are usually the ones mainly involved, the others being affected later in the disease. We are not considering congenital wryneck nor that which arises from spinal bone disease, but the true spasmodic torticollis and the so-called "rheumatic" wryneck. The spasms are usually clonic or intermittent at first, and gradually become more constant, more permanent, until they may become tonically rigid. Spasmodic torticollis is a pure nervous disease, occurring much more frequently in women than men, and in early adult and middle life. Occupations that place the neck muscles upon a strain, blows and reflex irritations are said to cause the disease, but the author has never been able to trace their relationships, and especially has he been unable to find any of the so-called "reflex" conditions causing the disease. The pathology is that of a bulbar neurosis, as a result of which the neuro-mechanism governing the movement of the neck muscles becomes unstable, indicating, according to the majority of authors, a premature decay of the nerve nuclei of the nerves involved, with a secondary involvement of the cortical centers. The disease is not fatal, and under usual treatment reaches a certain stage and remains chronic. Certain cases of the disease are relieved and cured, others are ameliorated, and in still others no benefit is received.

From a moderate experience the author knows no way by which

curable can be distinguished from incurable cases, save that of persistent careful trial. Surgery has very few cures to its credit, very many failures, and has oftentimes caused a recurrence in a new near area. The method which the author has finally reached, and which has given him the greatest success in the treatment of this disease, is the general treatment outlined just above in the treatment of facial spasm—that is to say, the electric light bath or superheated dry hot air to profuse perspiration, followed by the horizontal or circular rain bath and jet douche rapidly pushed to extreme toleration, followed by the fomentation and sponge. The local treatment by electricity is a little different from that administered in facial spasm. The *positive* pole of the high tension faradic coil and the negative pole of the galvanic current are carried to a large indifferent electrode placed upon the abdomen or lumbar spine. Two hot soda compresses are prepared and placed on either side of the neck; to the *spasmodic* side the *positive* pole of the galvanic is applied and the current turned on until ten to twenty milliamperes passes; on the other side—that is to say, the side *opposite the spasm*—sufficient of the *faradic current* from the negative pole is turned on to produce strong enough contraction to rotate the head into and slightly beyond the normal position. The treatment should last for five or six minutes. As a result of clinical experience the author is prone to believe that those cases that get well are of the pure neurosis type, those that do not are probably degenerative. Between these treatments massage is administered and the patient kept at rest in the prone position, and where necessary an apparatus should be constructed that will hold the head in its natural position and stretch the tonic muscles. As soon as we notice improvement in the condition we may gradually commence such resistive exercises as will overcome the spasm. This had best be supervised by the physician himself.

Rheumatic torticollis is usually found in children and very young people, the author having seen quite a number of these cases. Cold, exposure and rheumatism are causes that produce the disease. In those who have a so-called "rheumatic tendency," exposure to cold in the way of a draft of damp moist air playing upon the exposed muscles of the neck, is very liable to produce the disease. A myositis is generally present; in some instances the author is satisfied that there was a neuritis. These cases all get well, and the most favorable prognosis may be given provided the diagnosis is certain. The treatment is both general and local. The general principles outlined in the treatment of muscular rheumatism may be followed in this affection, but the author has found the superheated dry hot air, using the body apparatus, is singularly effective. No difficulty is experienced in getting children to take the treatment. The patient should remain in the apparatus for twenty minutes, gradually increased to forty, and

the temperature given ranging from 200° to 275° F., great care being taken to carefully cover the skin with Turkish toweling. In the case of children it is wise to have a large sheet of Turkish toweling and wrap them in it, in addition to the usual covering, as they do not, as a rule, appreciate the necessity of remaining quiet. When this treatment is finished the horizontal or circular rain bath should be given at a temperature of 102° F. for one minute, reduced to 80° F. for ten seconds, under pressure of twenty-five pounds. In older children and in adults we may have recourse to the Scottish or alternating douche to the spine at a temperature of 105° to 110° F. for one-fourth minute, followed by a temperature of 75° F. for ten seconds, three to four alternations being necessary.

In the local treatment of these cases the hot compress wrung out of hot soda water and applied over the affected muscles in connection with the positive pole of the galvanic current will do much toward giving relief. Anti-rheumatic medicines may be administered internally at the same time.

Spasmodic tics, the "tic convulsif" of the French, is a chronic disease characterized by quick, sudden spasms of a single muscle or group of muscles, the movements being complete, strong and occurring as a movement, more frequently as a series of movements repeated several times. The intervening period of rest is variable. The most common tics are those of the orbicularis, causing blepharospasm and facial tic. The movements are sometimes accompanied by explosive disturbances of speech. "In these cases the patient at the time of the convulsive movement utters some obscene or profane words (*copralalia*), or involuntarily repeats the last word of the sentence spoken to him (*echolalia*), or spasmodically imitates a gesture made to him (*echokinesis*), or involuntarily exclaims the thought uppermost in his mind, probably revealing some secret against his will (*tic de pensee*). The peculiar disorder of the Maine "jumpers," characterized by sudden violent movements upon being touched or startled, is a form of tic. So also are the singular troubles known as latah occurring in Malay, and myriachit occurring in Siberia and Kamchatka" (Dana). The treatment of these disorders is unsatisfactory. The best results are obtained from the complete rest treatment, which has been fully dwelt upon heretofore; in fact, these cases should be managed as one would hysteria of severe type. The *sine qua non* of treatment is the reconstruction of the general health, and this is favorably aided by hydrotherapy. Gelsemium sometimes helps.

1 Dana, C. L., "Text-Book of Nervous Diseases," 1897.

Insolation, Sun-Stroke; Heat Stroke; Thermic Fever; Cerebral Hyperemia.

Insolation is a term applied to a series of symptoms, accompanied by a depression of the vital forces, occurring as a result of exposure to undue or excessive heat. It is too great accumulation of heat within the body which is precipitated upon the nervous system—that is to say, upon the brain as a whole—probably accompanied by intoxicating products of tissue metabolism.

Males are more frequently affected than females, owing to the fact they are more exposed to heat, which is usually the principal factor in the causation of the trouble. It should be borne in mind, however, that in an exposure to sunlight we must take into consideration the actinic ray, for in sun-stroke it is largely the actinic ray rather than the heat that causes the affection. It has been found by the British army authorities that the pernicious influence of the actinic ray may be overcome by lining the helmets and coats with yellow silk, which prevents the penetration of this part of the solar spectrum. In like manner the Arabs and other nomads of the desert have for generations bound about their heads the gaudy yellow turban in numerous folds, gratifying alike their love of color and at the same time shielding themselves from the effects of the sun's rays.

Heat-exhaustion may be brought about by undue or excessive exertion in heated temperatures, especially with improper ventilation. Exercise strongly favors the production of heat stroke. It has always seemed to the author a matter of serious import to see small children go about at the seashore with their heads exposed to the blazing rays of the sun while they wade in cold water, chilling the extremities and favoring a condition likely to be followed by heat or sun-stroke.

One of the most common predisposing causes of insolation is indulgence in alcohol, and it may be said that this is *the most common and the most dangerous* of all causes. Alcoholics are careless, exposing themselves unduly, and owing to alcohol's obtunding action upon brain and body they fail to appreciate the effect of the heat upon themselves. Other contributing causes are great bodily fatigue, especially in unventilated surroundings; much mental worry, insufficient food and unsanitary surroundings. Unusual disturbances of metabolism accompany these cases. It is a well-known fact that the presence of a large amount of moisture in the air is favorable to the production of heat stroke. The writer has experienced intense heat upon the plains of Colorado and New Mexico with comparatively no discomfort, owing to the dry and clear atmosphere of these regions. Insolation is much more apt to occur in the "horny-handed son of toil," carrying his hod or wielding his sledge, laying a tin roof or harvesting the hay, running a steam engine or firing a furnace, than

the citizen who sits in his office or takes his exercise under a raised umbrella, accompanied by a palm-leaf fan.

The seizure, as a rule, is accompanied by premonitory symptoms of a sense of fullness in the head, headache, vertigo, distress, fullness in the epigastrium, and a general sense of lassitude, weakness, dimness of vision, nausea, and later insensibility. It should be borne in mind that heat stroke is but a mild form of thermic fever.

The development of the attack is rapid and the prostration great. The face is pale, the voice weak, the pulse rapid and feeble, the respiration quick, temperature 102° to 103° F. with partial unconsciousness. Where sun-stroke, thermic fever or true hyperpyrexia takes place, which is an aggravated form of the above, we find that it develops more suddenly, with insensibility and unconsciousness, with or without delirium or moaning. The skin is flushed and red; the body surface hot, dry and burning; breathing rapid, shallow and stertorous; pulse quick, full, bounding at first, rapid, weak; temperature 104° to 116° F.

The pathology is unknown, the action being so rapid that few structural lesions take place, although all the organs are in a state of venous congestion. The blood is dark, thin, and its coagulability destroyed. Post-mortem rigidity is early marked. Lambert and Van Giesen, after investigating 805 cases, came to the conclusion that "the prodromal symptoms of sun-stroke are those of acute functional disturbances, while the later symptoms, much more serious, point to grave changes in the blood and in all the nerve centers, especially those of the latter which control the thermic mechanism of the body." Universal acute degeneration of the neurons of the central cortex of cerebrum and cerebellum takes place, the same changes being found in less intensity in the spinal cord. The changes were similar to those produced by alcohol, lead and bacterial products. Organisms have been found of linear, incurved and constricted appearance, with filiments, motile but no cilia; their relation has not been determined.

It has always seemed to the author that insolation was the resultant of increased production and diminished elimination of heat, together with interference with the mechanism regulating heat production and elimination. Wood says that "when a man is exposed to heat beyond his power to resist there is a gradual and slow rise of temperature until the stimulus of heat becomes so intense as to paralyze the heat centers and vasomotor nerves, as the case may be, with probably a sudden intensifying of the process of oxidation, accompanied by the overwhelming of the cerebrum."

The first step in the treatment of heat exhaustion or sun-stroke is an immediate removal of the victim from his surroundings to an atmosphere as cool as possible. He should be laid upon his back, his head elevated, and all clothing immediately loosened, especially any

constriction about the neck or abdomen. Cold applications must be immediately made to the neck and head by means of wet cold cloths or compresses. Nothing is better for immediate use than a towel folded lengthwise, dipped in cold water, and wrapped loosely about the neck while cold water is applied to the head. It is much more efficacious to apply the cold immediately on the ground than to wait until the patient can be removed to some hospital. Much valuable time is thereby lost and the patient's nerve centers endangered by the delay. As soon as possible the patient should be removed by means of an ambulance to his home, or, what is better, some hospital, applications of cold water being constantly kept up *during the trip*. Ambulances that attend such calls in the summer should be supplied with ice and cold water, the former of which must be kept around the patient's head while cold water and friction are applied to the body surface during the trip.

Where the attack is sudden, the fever high, and circumstances do not permit the removal of the patient's clothing, no attention should be paid to his personal apparel, but buckets of cold water should be poured or dashed over him from a distance of four to five feet, while several persons rub his arms, legs and trunk. The writer has seen a number of these cases, and not in any except in cases under his own control has he ever observed the application of friction to the surface of the body while applying cold water. The rationale of this procedure has been so often demonstrated in the application of the cold bath in typhoid fever and all conditions of pyrexia that it should have taught the profession the need of its use. There is present a depreciation of the vital forces of the nervous system, and the greatest benefit that is derived from the use of the bath is as a *nerve stimulant*, that of an *antipyretic being secondary*. The application of cold accompanied by friction dilates the blood-vessels of the skin, draws the blood from the brain and viscera, favors heat elimination, causes tonic contraction of the blood-vessels, powerfully stimulates the vasomotor system, and by reflex effects lessens heat production. That the enormous vascular area of the skin is capable of rapidly carrying off the accumulated heat is well known, and the reduction of temperature by cold applications depends largely upon the excitation *of the cold and friction* upon the peripheral nerves and blood-vessels, rather than upon its direct antithermic or heat-reducing power. The mechanical effects in the production of these results are immediate, and for this reason it has been suggested that the water should be thrown or dashed upon the patient in order that we might get the stimulation of the force of impact.

When the patient reaches the hospital or home the clothing should be immediately removed and cold applications continued. If we have to deal with heat prostration where the pulse is feeble and weak, the

temperature not over 102° or 103° F., we may use the ablution, as suggested by Baruch.[7] "The patient, lying upon a rubber sheet which is covered with a blanket, is rapidly bathed and rubbed for ten minutes with a wash cloth or large crumpled piece of surgical gauze saturated with water at 75° F. If the skin shows reaction, this ablution may be repeated in half an hour with water at 70° F., again in half an hour with water at 65° F., and so on until the rectal temperature falls two to three degrees. It is a serious error to continue bathing until the temperature approximately reaches the normal point." Where we have to deal with serious pyrexia, with unconsciousness, the cold pack may be applied. No blanket should be used in this application, but a sheet kept cold by repeated wetting, accompanied by friction. This may be kept up for thirty or forty minutes, while during its application a turban wet in ice-water or an ice-cap is applied to the head. Unconsciousness may be frequently relieved by the application of a fine stream of ice-water to the forehead for half a minute, intermitting and applying several times. It will sometimes arouse patients when all else fails. When the temperature subsides to 102° or 104° F. the patient should be removed to a dark room, preferably kept cool by an electric fan, and cold compresses or the ice-cap applied to the head and kept there during the stay in the hospital. The patient should be urged to drink freely of ice-water unless high arterial pressure be present. All the emunctories must be thoroughly stimulated, and upon the slightest indication of a secondary rise in temperature, hydriatic measures should be at once adopted, either the Brand full bath at 65° F. or the cold pack repeated. The patient must be kept in a recumbent position for several days under the cold-air blast. As a rule, exertion and too long continued application of cold water is to be avoided. Experience, judgment and care are required to adapt hydrotherapy to these cases, but success is usually the result of its intelligent application. The author has found in cases of threatened cardiac failure the ice-bag applied over the precordial region a treatment of great value.

Fowler[8] says that ice-water enemata are very valuable in the treatment of insolation. In his Indian experience he saw many cases of the affection, with a greater percentage of recovery from its use, although it can be combined with external methods. A quart of "iced water" was given per rectum until the axillary temperature fell to 102° F. All cases recovered. Prodromal symptoms (drowsiness, headache, dizziness, temperature 103° to 104° F.) were so treated and patients left the hospital quite well on the following morning.

The after-treatment is important, and should consist of daily graduated cold applications, care being taken to thoroughly cool the head

7 Baruch, Simon: "Hydrotherapy," 1897, p. 142.

8 Fowler, M. F.: Journal of the Royal Army Medical Corps, December, 1906.

before each treatment. As a result of the heat-stroke, the patient's nervous system and vasomotor mechanism have received a severe shock, and we often find traces of injury to nerve functions, such as headache, vertigo, insomnia, nervous irritability, altered disposition, tender spine, indigestion, anemia, irregularity of respiration and heart action, morbid dreads, mental excitability, or an incapacity to stand heat or the sun's rays. In the after-treatment it is essential, therefore, and advisable that the patient be put upon a light diet; that he refrain from the eating of meat during warm weather; that he be compelled to drink daily at least one-half gallon of water; that all digestive conditions and constipation be corrected; and that all measures be continued which will stimulate and regulate the nerve functions and place him physically and nervously in prime condition. For this purpose institutional treatment should be commenced immediately after the attack and continued *during the period of hot weather and long into the fall or winter.* Nothing is superior in these cases to the careful and persistent use of the electric light bath for several minutes, keeping the ice-helmet on the head, followed by the horizontal rain bath at 100° F. for one minute, reduced to 65° for one-fourth minute. As soon as reaction is well established and resistance increased we may add the cold jet douche at 60° F. up and down the spine, paying especial care to the cervical region. In very sensitive cases the electric light bath may be omitted and the treatment given as outlined, the patient wearing the ice-helmet during the rain bath. The author has had the pleasure of seeing a number of cases entirely freed from unpleasant sequelæ by the adoption of these methods.

Every large city in the Union has its quota of heat- and sun-strokes, and while each city has comparatively few, considering the population, still these cases during the summer run into the thousands, taking the whole account. Ambulances starting for cases of this character should be well supplied with water, ice and an ordinary sprinkling can, for with this simple paraphernalia great good can be done, pyrexia reduced and much suffering averted.

CHAPTER XIX.

MENTAL DISEASES.

Mania; Manic-Depressive Insanity.

Mania[1] is a form of insanity characterized by accelerated flow of ideas, mental exaltation and motor excitement. The elated mood is unattended with mental pain, and motor excitement follows as a resultant of the rapid flow of ideas, translating them into acts. It is the popular idea of mental disease or insanity. It is an objective disease, easy to diagnose, and the antithesis of melancholia, although the attacks are usually preceded by a stage of melancholy and vague unrest.

Mental exaltation is most frequent in the young; it represents the natural exuberance of childhood. What is normal in the child is abnormal in the adult, and constitutes cortical instability. Owing to this unstable condition and tendency towards exuberance, children are more apt to have febrile disturbances or delirium, while peripheral irritation from such causes as worms and indigestion may cause convulsions. Some individuals are by inheritance and disposition predisposed to elation, just as others have a tendency toward melancholy, and it is certainly true that this tendency oftentimes shapes itself into forms or phases of mental disease.

In the simpler varieties of mania the patient acts a great deal like a person under the influence of a stimulant, all the various mental operations being quickened, of a pleasurable character and diametrically opposed to those of melancholia. To those suffering from mania the sun shines brightly, the world is rosy-hued, friends abound, and he is bright, clever, smart. His capacity for conversation increases rapidly and his brain is crowded with a chaos of ideas he is unable to control. He laughs, jests, and is jocular with his friends; is strong, virile, delighted with himself and all things. If he indulges in business he takes up many new schemes, writes many letters, his physical activity being great, and in many instances rushing from place to place. If carefully questioned, however, some mental dullness is detected. Later there is a continuous flow of ideas without concentration; in fact, if we attempt by various means to hold his attention and attract his mind it will be found that he cannot concentrate upon

[1] The author recognizes the modern classification of the insanities, especially the manic-depressive type, but has adhered to the older classes because it seemed to him to present some advantage in such a work as this to consider these states more as separate entities.

any one thing for a single minute. Oftentimes a question will start a fresh outburst. The memory is wonderfully accurate, and the attention and observation so close that nothing escapes. To those who have observed mania it is marvelous how little fatigue is present. Illusions, hallucinations and delusions are usually of a pleasant and expansive character, and, generally speaking, transitory in duration. The sexual instinct is morbidly increased in both sexes.

In the later stages of the fully developed disease the patient laughs, shouts, howls, runs about, dances, and is dirty and filthy in his habits. This mental excitement is accompanied by violent muscular acts in which he may destroy property and strike persons. Profanity and obscenity occur with great frequency, even in women who have all their lives been cultured, refined and surrounded by those influences that would tend to prevent the acquisition of such knowledge. Owing to the lack of mental control there is an absolute loss of the sense of modesty. Sleeplessness is a prominent factor in these cases. The skin is usually dry, the pulse increased, and a marked loss of flesh takes place.

The usual causes assigned as the production of mania are those of mental overwork and worry; physical or muscular overstrain; bodily ill-health of all kinds, especially that arising from indigestion and malnutrition; the various forms of febrile diseases; parturition and surgical operations. Here, again, an hereditary weakness may be present, and if this is coupled with mental stress and physical overstrain mania may result. The pathology is unknown, there being no anatomico-pathological data. It therefore must be functional in nature, probably due to some toxemia or interference with the nutrition of the cortical neurons. Recovery usually takes place in about 70 per cent. of the cases. It is generally gradual, and in some instances leaves behind a detectable defect. Death occurs in about 5 to 10 per cent., due to exhaustion or some intercurrent disease, such as pneumonia or nephritis. Some cases terminate in chronic mania or dementia. The prognosis is in the main favorable, although if the patient does not recover within the first six to eight months it is much less favorable. After two years the prognosis is bad. The younger the patient the better the chances.

Few persons are so situated as to treat cases of mania in a private home, it being necessary in such instances to not only secure a suitable place, but to have two or three—sometimes four—trained nurses in constant attendance. The patient should, as far as possible, be kept in bed and rest secured, restraint being used if necessary. Forced feeding is a necessity, and the author agrees with Clouston[1] that eggs and milk must be given in enormous quantities if we wish to succeed

[1] Clouston, T. S.: "Clinical Lectures on Mental Diseases," 1884; "States of Mental Excitement," p. 141.

in restoring these patients to health. The failure to secure the best results in asylum treatment is probably due to the fact that patients do not receive the superalimentation they deserve nor the careful attention to the skin and bowel. Sedatives must be used, and of these the best is hyoscin hydrobromate; tonics should always be given—bitters, iron, hypo- and glycerophosphates. In the acute stages of mania the neutral bath is decidedly *the* measure of securing proper sedation. It is best administered by giving the patient a hypodermic of hyoscin so as to overcome his struggles and objections, and as soon as possible placing him in the bath with a cold turban upon the head. It is often remarkable to note the beneficial influences of this form of hydrotherapy. The author shall never forget the effect upon him of observing the use of the bath at Bethlehem Hospital in London. At that time the neutral bath was not in use among American alienists, and as he was just fresh from a hospital experience in this line the effect was to him most startling. Since then he has on a number of occasions been able to secure most favorable sedation by this simple measure, which can be administered in almost any home. The duration of the bath should range from thirty minutes to several hours. Its action has previously been explained. When this cannot be carried out we may employ the felt pack wrung out of water at a temperature of 110° F. and the patient accurately and carefully enclosed therein. The duration of the pack should range from one to two hours, and if found effective may be repeated again within eight to twelve hours. Sometimes this treatment cannot be carried out for lack of facilities, and we may have to resort to the sponge, placing the patient between blankets and sponging with a rough Turkish bathing wring out of water at a temperature of 110° to 120° F.

As convalescence proceeds we may have recourse to some of the more tonic or stimulating measures, commencing with the cold sponge at a temperature of 80° F., followed by a vigorous friction to secure a good reaction. Reduce two degrees daily to 70° F. Where possible we should then institute the electric light bath or hot-air bath until free perspiration has been secured, followed by the horizontal or circular rain bath at 100° F. for one and one-half minutes, reduced to 70° F. for one-fourth minute. This should be followed by a good rubbing and perfect reaction. Hand in hand with this treatment the increased alimentation should be taken and fresh air and exercise secured.

Melancholia.

Melancholia is a mental disorder characterized by profound mental depression, mental distress, retarded mental action, lessened motor activity, and peculiar facies, in some cases attended by agitation and in most by suicidal impulses.

The intensity of melancholia varies, the simpler forms being closely allied to neurasthenia—psychasthenia—although even in these cases there is to the trained eye the peculiar expressions of pain, distrust and mental inactivity. In these simpler forms we find the cerebral reflexes lessened; that the various sensations, activity and environment cause psychic pain. Every act, every thought, every impression are no longer received as agreeable, but in their passage through the cerebral cortex are transformed and metamorphosed into the mournful and sad.

Many individuals are by natural tendency psychalgic, and this melancholy occurs transiently from varying causes, although we most frequently find back of it some easily discovered bodily condition. Certain types seem more predisposed to melancholia because of their brains being cast in finer mould; they are sensitive, high-strung, of a poetic, emotional and sympathetic nature, subject to moods of a depressive character, and oftentimes reaching the borderline of true melancholia when their physical well-being gets below par.

There is the antithesis of this in the common man and woman of coarser mold, who, incapable of feeling intense joy or pleasure, yet are strangely predisposed to take gloomy views of life, to tinge their thoughts constantly with gloom, to take a so-called intensely religious view of things, and to these melancholia frequently comes, owing to their lessened resistive power and warped worldly view. These cases, in my experience, have been especially prone to melancholia in later life unless acute disease has not precipitated earlier attacks. In religious people melancholia is more difficult to cure, owing, in my opinion, to the prevalent false views and terrifying impressions these people are apt to have, even in health, of the future life. To these people religion may actually be a predisposing factor in the causation of the melancholia, and their symptoms, hallucinations, delusions and general cerebral action will be tinged and colored by their religious belief and associations. The reasoning powers are, as a rule, intact, but in this domain of cerebral action we will find that, though the melancholic reasons well, his reasoning is slower than normal and tinged with the darker side of life. Melancholics retain a more normal mentality than any other form of mental disease, and it may be stated that theirs is the sanest form of insanity. Memory is usually well retained, and even in bad cases, as soon as attention is secured, accurate answers to interrogatories can be made. These are the patients across whose face there never flits a smile—that wonderful illuminating light, a reflex of the soul within—and as everything is transformed into mental pain it is, for this reason, a great mistake for friends and relatives, in their well-meaning endeavors, to "jolly up" and cheer a melancholic.

Melancholia is present more frequently in females than in males,

and this is not due to the presence of the pelvic viscera, for although pelvic lesions may cause melancholia, it should, in passing, be noted that the correction by operation or otherwise of the condition does not cure. Heredity will be found in about half of the cases. Physical ill-health, over-strain, mental worry and distress are powerful factors, and it may be said that where defective heredity is present, accompanied by physical ill-health and over-strain, supplemented by mental worry and distress, we have the great tripod upon which melancholia is built. In younger cases any great depreciation of the general health, acute infectious diseases, love affairs, with the novel stresses and exciting incidents thereto, may oftentimes produce the disorder. One of the most important causes present, in my opinion more frequently than any other, is auto-intoxication arising from the gastro-intestinal tract.

The diagnosis of melancholia is usually easy, being based upon the melancholy, mental distress, the presence of the peculiar facies, persistent insomnia, post-cervical ache, hallucinations, delusions, etc. Melancholia runs, as a rule, a slow course, estimated by most authorities who deal with asylum cases at from six months to two years. This duration is probably to be accounted for by the fact that melancholics placed in asylums receive largely custodial care, and not that individualized attention that is necessary to their cure.

In my personal observations and experience the treatment has ranged from two to four months in simple melancholia. The recovery is usually gradual, and as convalescence takes place a betterment of the physical health is noticed. Recovery takes place in from 85 to 90 per cent. of the cases. For some time after patients reach a sufficiently normal state to return home and to their occupations we can frequently detect a slight incapacity for intellectual effort where complicated problems or conceptions require quick judgment. Deaths in melancholia are most frequently due to suicide, inanition, pneumonia, and in long-drawn cases to tuberculosis. The prognosis is favorable, less so in the agitated and catatonic types. Relapses are apt to occur unless the case is watched a sufficient length of time after dismissal. The rule in the management of cases of melancholia should be never to commit a case, if possible, to the asylum, owing to their inability to secure the individual attention so necessary. They should be given private care, best in small sanatoria, in this way combining every advantage of treatment and avoiding the stigma of the mental hospital. The asylum should be the last resort for those who are able to secure other treatment, or only when the violence of the case demands it.

In the treatment of melancholia it is most important that we should at once isolate the patient. By so doing we remove him from his old environment, where familiar faces and surroundings tend to cause a

recurrence of the same ideas; it separates him from the sympathetic and foolish relatives and friends, who have the idea that he should be cheered up and entertained. These cases are nervous and irritable, and this disappears frequently immediately after isolation is completed. It is essential to have a nurse with such cases in order that mental and moral control may be exercised. Rest of body is a very valuable adjunct in connection with the other treatment. Traveling is frequently recommended, but traveling and amusement are painful to the patient, and are of no value until recovery has taken place. For the same reason health resorts do not help the melancholic, but when recovery has taken place and further rest seems advisable, we may in summer recommend the coast of Maine, the Great Lakes, and in winter, Florida, California, the Bermudas, Asheville, etc.

Food should be administered in large quantities; in fact, superalimentation is necessary, and to this end we may use, in addition to the ordinary meals, milk, koumyss, matzoon, plasmon, raw eggs, meat juice, malt, and, if necessary, stimulants. Forced feeding is the rule for these cases. A careful, attentive and conscientious nurse forms an important element in the treatment. It is important to carefully regulate the constipation and secure, if possible, intestinal antisepsis. Hydrotherapy plays a most, if not the most, important part in the management of these cases, for through its influence we secure a powerful tonic, eliminant and reconstructive influence. As a rule, the blood pressure in melancholics is usually high, and for that reason we should slowly train these cases to stand cold water, avoiding very cold baths and prolonged cool applications.

The hydrotherapeutic treatment of melancholia may be divided into two classes—that which can be administered in the home and institutional methods. Many cases of melancholia can be successfully treated in the private home if proper measures are instituted. In addition to all that has been previously said, we may commence the treatment of the case with the cold sponge at a temperature of 90° F., reducing the temperature two degrees daily until 70° F. is reached, care being taken to follow the application of the sponge by vigorous friction with a crash towel. Some patients seem to be impressed by a subsequent oil rub, which is probably due not so much to the oil as to the rubbing or massage. As soon as the patient's reaction has been slightly trained we may move up a notch to the dripping sheet at a temperature of 70° F. for three minutes, applied with vigorous friction, while the patient stands in a foot-tub of very hot water. Care should be taken to see that the proper reaction is secured. Immediately following the sheet the patient should be put to bed and given food, preferably hot milk. This treatment is best administered in the morning before breakfast, and as these cases suffer so persistently from insomnia in conjunction with the dripping sheet, the full pack

may be given, preferably at bedtime. The author generally commences with a temperature of 80° F. for forty to sixty minutes, reducing the temperature two degrees nightly until 60° F. is reached, at which point it is maintained. After the patient has been in the pack for one hour he is removed, quickly dried *without inducing reaction*, given a glass of hot milk, and if necessary a hypnotic. This treatment has in most cases broken up the most persistent insomnia. Where the pack cannot be administered—and this is most frequently due to the fact that the physicians and nurses do not understand its application—we may use the neutral full bath at a temperature of 94° to 96° F. for thirty minutes, increasing the duration five minutes nightly until the patient remains in the bath a full hour. Where this cannot be utilized a hot and cold spinal sponge in conjunction with the hypnotic will oftentimes marvelously enhance its action and enable the physician to give a smaller dose. The above measures are within the reach of any intelligent physician who cares to take the time and trouble to carry them out.

Institutional treatment is by far the most successful and beneficial as it places the patient under the most favorable circumstances of isolation and enables the treatments to be administered by physicians and nurses who are well acquainted with the application. The author divides the sanatorium treatment of these cases into those who are bed-ridden and those who are ambulatory. In the former the same treatment as outlined for the private home is utilized. Where the case is up and about we may commence at once the use of the electric light bath or hot air bath until free perspiration takes place, followed by the horizontal rain bath at 100° to 104° F. for one and one-half minutes, reduced to 80° for one-half minute; reduce two degrees daily to 70° F. As soon as this point has been reached give the foregoing treatment, and in addition add the jet douche to the spine at 70° F. for ten seconds. In addition to this treatment we may, if the insomnia remains persistent, add the neutral bath at bedtime or the hot and cold spinal sponge. For the loss of appetite the free drinking of cold water and the administration of the ice-bag to the epigastrium for half an hour before meals is an excellent method. The writer has seen cases of melancholia improve before the end of the first week under this treatment. In addition, it is, of course, understood that the bitter tonics, glycero-phosphates, the nitrates, opium and codeine may be administered if needed.

When convalescence is established occupation in the open air or some such exercise as driving, golfing, the study of natural history or botany may be followed with great advantage. Associated measures that oftentimes materially aid in helping the case are massage and the different forms of electricity.

Confusional Insanity.

The Exhaustion Psychoses; Acute Delirium; Acute Dementia; Primary Dementia; Infection Psychoses; Febrile Delirium; Korsakoff's Psychosis; Post-Febrile Insanity; Toxic Psychoses; Alcoholic, Morphine, Cocaine and other Drug Insanities; Post-Operative Insanity.

Confusional insanity is a general term used to designate a group of psychoses characterized by marked confusion and attended with quickly changing illusions, hallucinations and unsystemized delusions, in the course of which excitement, depression, mental enfeeblement and stupor may take place. An essential element in the disease is a mental confusion that dominates the course of the malady. The illusions, hallucinations and delusions are rapidly changing, so that there is present a constant varying ideation, phantasmagoric in character, without any relation or system. In these two ways this disease is the reverse of paranoia. The intensity of the disease varies from a condition where the patient can give true and accurate accounts of his hallucinations and delusions to conditions of exhaustion and stupor that render him incapable of intelligent response. The disease is usually found in the active period of life, most often between twenty-five and fifty, occurring more frequently in men. There is probably less heredity basis in this form of insanity than any other of the psychoses. This cannot be said of those cases of alcoholism and drug habituation, who usually have a neurotic basis back of the disorder. Attention is called here to the difference between morphinism and the allied drug habits without any mental disease and the confusional insanity that develops with them as a causal factor. The author has found typhoid fever, grippe and alcoholism to be the most frequent individual causes. The disease is best described as follows:

"On recovering from a shorter or longer febrile state the patient begins to show signs of irrationality and mild delirium. This may end in an attack of acute delirium. When this exists, the mind, instead of clearing, becomes clouded and confused. There are now hallucinations of sight or hearing, with various unstable delusions, especially as regards the place he is in and the people about him. He talks incoherently at times, describing things on the wall or people in the room, or appears to hear voices and people outside. At times he may be so excited that he tries to get out of bed and has to be restrained. His lack of orientation and defects of memory are great, and he will insist that he was walking on the previous day or has received visitors whom he has never seen. He often responds well to direct and simple inquiries, and at times seems fairly lucid, but soon lapses into incoherence. If quite ill physically, the confusion and irritability are shown in the low delirium, which is worse at night. He sleeps badly, and is at night especially apt to be disturbed by his hallucinations and illusions. The confusion may be so great that he fails to respond sensibly to any inquiries. After a few weeks, or perhaps a few days,

the mind begins to clear, the delusions and hallucinations disappear, and there is lucidity of thought and response. But for some time the mind is weak, thought is slow and memory defective, and there may be some apathy and depression."[3]

The convalescence is, as a rule, in these cases generally preceded by a mild form of dementia, recovery generally taking place by gradual diminution of the symptoms. The duration of the disease varies from a few days to five or six months, although the general course is usually short, ranging from four to ten weeks. The prognosis is, as a rule, favorable, especially so if the patient can be subjected to the proper treatment and nursing and if the treatment is instituted early in the course of the disease. The patient usually recovers from the psychosis, provided the bodily disease or febrile disturbance from which he is suffering does not cause death. The above favorable prognosis does not apply to acute grave delirium, Korsakoff's psychosis, nor to those who are in an extremely exhausted condition.

Depressing drugs should be avoided wherever possible, and hyoscin, trional, sulfonal, *et al.*, given in the smallest possible doses. Tonics and supporting treatment, especially strychnine and cardiac tonics, should be administered. As a rule, it may be stated that the more hydrotherapy is employed the less medicine will be used. This does not apply to tonics.

The essential element in the treatment of confusional insanity is super-alimentation, careful nursing, and the elimination of the toxic or autotoxic poisons upon which the psychosis depends. In the treatment of confusional insanity it is best to isolate the patient, placing him in the charge of a couple of well-trained nurses. The family, sympathetic relatives and friends should be forbidden in the room until the patient's recovery is well assured. Rest of body and mind, as far as possible, is a necessary adjunct in connection with the other treatment. These cases should be kept as quietly in bed as possible, and every remedy of a depressing character withheld. The author is of the opinion that food is one of the best sedatives that can be given, and should be administered in large quantities, insisting upon three meals daily with two to three quarts of milk or an equivalent of koumyss, plasmon, raw eggs, meat juices, etc. Malt extracts will be found of some value; stimulants are at times demanded. It will be necessary with the increased feeding to watch carefully the digestion and administer laxatives. In the author's opinion hydrotherapy alone is sufficient to bring about a cure when used in conjunction with the hygienic and dietetic management. The application of hydrotherapy requires thought and adaptation of measures to the particular case in hand. In many cases, *hot hydrotherapy* [illegible] insti-

3 Dana, C. L., "Text-Book of Nervous Diseases and Psychiatry," 1904. Confusional Insanity, p. 452.

tured during the febrile or causative trouble the chances are that the psychosis might have been avoided. The psychosis once established, the aim of hydrotherapy is to favor elimination, tone up the nervous system, increase and equalize the circulation, improve the appetite and digestion, lessen nervous irritation and excitement, and induce sleep. We should commence in these cases as though they were being treated for some serious febrile disease. The patient is disrobed and placed between blankets, the first treatment being that of the cold sponge, commencing at a temperature of 90° F. and treating the body in sections as described in a previous chapter. The temperature of the water may be reduced two degrees daily until 70° to 60° F. is reached. This treatment may be administered twice daily, or, what is far better, administered in the early morning and mid-afternoon, and at night the full wet pack, commencing with a temperature of 80° F., reducing the temperature two degrees daily to 65° F. Where it is difficult to manage the patient and the wet pack for this reason cannot be used, we should substitute the hot and cold spinal sponge, which will produce sleep. Where the patient is exhausted it will probably be found impossible to do more than use the sponging, which may be followed in such cases either by an alcohol or oil rub. It has been the author's experience that the nearer we live to the line of the strict and full rest cure, which has previously been described, the better will be the success and the quicker the recovery.

Should *heart failure* seem imminent or the blood pressure markedly decreased, the ice-bag to the precordial region will be found a measure of exceptional benefit. The author has learned to lean too frequently upon this support not to know the value of the remedy.

Headache is best met by the application of the fomentation to the forehead, followed by the cephalic compress at a temperature of 60° F., renewing same as frequently as may be necessary. The ice-bag to the nape of the neck will also assist in relieving this condition.

Insomnia is best combated by means of forced feeding and hydrotherapy. An egg-nog or large glass of hot milk immediately following the wet pack will oftentimes produce sleep without the hypnotic, or where this cannot be obtained small doses of trional or veronal may be administered.

Mental excitement and motor restlessness may require the use of the full warm bath (98° to 100° F.) for thirty to sixty minutes, though this is probably best combated by the cold sponging, rest, and over-feeding. Restraint may be required. Should ordinary measures fail, the treatment for mania may be substituted.

Etiological factors must always be considered and treated. In those cases where puerperal sepsis is present, curettement should be performed and hot vaginal douches instituted. Any febrile disease acting as a causative agent must have its roots of consideration in

adapting the treatment to the particular case in hand. For this information the reader should refer to the sections in which febrile diseases are considered.

As soon as convalescence is established we may begin to use some of the more active hydrotherapeutic measures, and none will be found more generally applicable than the dripping sheet at a temperature of 60° F. for three minutes, accompanied with vigorous friction, while the patient stands in a hot foot-bath. Vigorous reaction is desired. At this time the full wet pack at 60° F. for one hour at bedtime will increase metabolism, relieve excitability and induce sleep. As soon as the patient is up and about institutional treatment should be at once adopted, and to this end we may give the electric light bath or hot air bath until perspiration takes place, followed by the rain bath at 104° for one and one-half minutes, reduced to 60° F. for ten seconds. The hydriatist will have to exercise caution in these cases in the use of the spray and jet douches, and should not use them until the patient has progressed well on the road to recovery. It should be the aim, however, to reach this point at the earliest possible moment consistent with safety. The following treatment may then be employed: Electric light bath until profuse perspiration takes place, horizontal rain bath at a temperature of 104° F. for one and one-half minutes, pressure twenty-five pounds, reduced to 60° F. for ten seconds, followed by the briefest possible spray douche to the body and jet to the spine at a temperature of 60° F.

Recovery having taken place, the treatment should not be discontinued at once, but must be maintained for several months in order to overcome exhaustion or any toxic condition. The patient must avoid all worry or physical strain, taking sufficient exercise in the open air of a gentle character, of which driving and golfing are the best measures. Increased feeding must be maintained. If possible the case should summer for several months on the Maine coast or the Great Lakes; or in winter California, Florida, North Carolina mountains, Bermudas, etc., may be utilized.

Paranoia.

Chronic Delusional Insanity; Monomania; Folie Raisonnante; Primare Verrücktheit.

Paranoia is a chronic progressive psychosis developing soon after maturity, and characterized by logical and systemized delusions of, first, persecution, and later those of self-exaltation or grandeur, without excitement, emotion, ideation or impairment of memory. The most important factor in this disease is that of heredity; this may be direct or indirect. Krafft-Ebing believes that there is never a case without hereditary taint. It occurs oftener in men than in women, according

to the majority of authors, though my experience has been the reverse. It occurs most frequently between twenty and forty, and affects individuals who from childhood have exhibited many peculiar morbid conditions. The cases often present stigmata of degeneration, especially malformations of the cranium, ear and palate.

The childhood of the paranoiac is usually marked by peculiarities and eccentricities. The companionship of others is avoided, they are morbidly shy, mistrustful, irritable, oftentimes seeking solitude. Egotism is especially apt to be prominent, as also is selfishness—expecting much, giving little. The effect of puberty and adolescence is to increase the proclivities already present and to bring out positively and more clearly the incapacity of the patient. As further growth and development take place the patient begins to realize that he is different from the average individual about him, and, watching his symptoms more closely, becomes morbidly introspective, both as regards his bodily sensations and the rush of peculiar ideas through his mind. These are the cases that usually form the large group commonly designated "cranks." They are, as a rule, immature or abortive forms of paranoia, conditions that are rarely carefully studied for their morbid psychology except by the specialist.

Built upon the hereditary basis above mentioned, the disease is generally of insidious origin. The early period is associated with depression and delusions of persecution, which at the inception of the trouble irritate and distress the individual, who oftentimes calls his delusions into question. As time passes on the delusions become more or less fixed, and the individual then "lives in the atmosphere of suspicion; everything to him has a covert meaning, and 'trifles light as air become as proof of Holy Writ.' Indeed, Shakespeare's description of Othello's jealousy is and excellent picture of what is often seen in paranoiacs."[1] It is upon this basis of persecution that he builds his expansive and grandiose delusions, arguing that if he is watched and persecuted he must be someone worthy of the persecution, and in his morbidly logical mind he exalts himself far above his class. It is sometimes astonishing to note the clearness, accuracy and forcefulness of memory, judgment and reasoning power of these individuals, for, if the premise is granted, the reasoning is carried to an almost perfect consummation. So remarkable, indeed, is this quality of the paranoiac that it is incomprehensible to the lay mind that such an individual can be insane. These patients form one of the most dangerous classes of the insane, for, acting under the impress of their delusions, with their judgment and mental capacity unimpaired, save in certain directions, they are capable of performing most cold-blooded acts, which bear upon them the impress of a total lack of the ethical sense.

[1] Gray, L. C.: "Nervous and Mental Diseases," 1897. Paranoia, p. 373.

The delusions and hallucinations that these cases take up are without limit, and to attempt to name many of them would be foreign to this work. Suffice it to say that many take up ideas about electricity, the telephone, phonograph and other similar lines. Many paranoiacs have attempted homicide under their delusions of persecution, the most notable of whom were Norcross; others believe that they are the lover or the loved of some notable or prominent person, such as Dougherty, who followed Mary Anderson all over the country. The same man shot Dr. Lloyd, of the Flat Bush Asylum. Many of these cases are fond of litigation, which may arise out of some previous loss of property or injury to reputation by lawsuits. One of the most common of the delusive states is that of a great inventor. The author personally is aware of such an instance in his own experience, that was exceedingly distressing as well as unpleasant. "Many paranoiacs have distinguished themselves in sacred and profane history, and even in literature. There have been many false prophets who have come to herald a new religion—Mahomet, Swedenborg, Johanna Southcott, Jeanne d'Arc. We have had them in the United States within a few years—the healers, exploited by the press. Among the political reformers we have had John Brown, Guiteau and Czolgosz."[5]

The pathology is without anatomical basis, no changes having been as yet detected with the means we have at hand for investigation. Gross anomalies exist. Dana[6] suggests that there are probably certain defects in the normal arrangement of the projection system and associated paths.

The prognosis is almost uniformly unfavorable, no patient ever recovering. Remissions occur in the disease, and the patient may reach a fairly normal state and remain so for a number of years, providing his surroundings are suitable. Usually, however, these cases, after reaching a marked delusional stage, become excitable and dangerous in their actions, and at this time are generally removed to an institution. Here they gradually quiet down, and under restraining influence and care, with the freedom from irritation that is found in institutional life, may live to an advanced age, and retain during this time a fairly rational condition. This breaks down whenever he is subjected to the trials and strains of a return to active life.

In the treatment of this disease the endeavor should be to bring about the most satisfactory environment possible—that is to say, rest, quiet, freedom from worry and care, with little excitement and strain upon the individual. He should be given regular outdoor life, occupation sufficient to keep him physically tired, which will probably do more to prevent the constant recurrence of his ideas than almost any other method of treatment. Some amusement and recreation

5 Church and Peterson: "Nervous and Mental Diseases," 1899. Paranoia, p. 743.
6 Ibidem, p. 354.

are essential, although labor should be the principal element in his management. It acts as a mental counter-irritant. Everything should be done to build up the general health, and to this end the electric light bath or hot-air bath, favoring as it does elimination and reconstruction, followed by the circular or horizontal rain bath at 100° to 102° F. for one and one-half minutes, pressure twenty-five pounds, gradually reduced to 60° F., administered daily, will oftentimes aid in bringing about a remission and maintaining it. Where the patient becomes excitable and nervous the neutral bath at 94° to 96° F. for twenty to sixty minutes oftentimes proves most effective.

The true treatment of the paranoiac should be that of prevention, and while treatment may not altogether prevent the occurrence of the disease, it may so modify and restrain its development as to place the case in the simpler category of "crank." To this end the child should be treated along the general lines laid down in another section of this work (The Rearing of the Neuropathic Child). It is to be regretted that parents, guardians, teachers and those who have the custodial care of children do not pay more attention and care during the tender years of childhood to the preventive feature of future neural and psychic disease. The author is constrained to believe that the fault lies at the door of the *family physician*, whose practice and intimacy with the family during the rearing of the immature and mouldable child is oftentimes so close that he could, by his guidance and suggestions, prevent future trouble by instituting the proper hygiene, diet, exercise and other measures mentioned.

Dementia Precox.

Dementia precox is the generic name applied to certain mental diseases, observed more particularly in the male sex, appearing usually before adolescence is complete. It is a disease that runs a long course, and is characterized by silliness, some mental excitement, delusional and stupid states, motor disorders, and progressive mental exhaustion, terminating usually in dementia. These cases are apt to be confounded with neurasthenia and hysteria, from which they should be carefully differentiated. It is a disease of the developmental period of life, usually before the age of twenty to twenty-five years. There may or may not be an inherited history, but the consensus of opinion is that the disease is due to a congenital defect of some kind. Neuroses, drug habits and alcoholism in the parents can oftentimes be traced. The ideas, actions and mental peculiarities of these cases are moulded and formed under the influence of thousands of impressions streaming into the developing brain of the adolescent just after puberty. The enormous influence of the development of the sexual function and the stimulation of the emotional side of one's nature, that invariably accompanies its establishment, leaves an impress upon the

mind and brain of the healthy individual long to be remembered, and upon the unstable organism its action is intense. Into the life of the individual come new ideas, new interests, new thoughts, new cravings, new delights, and over all there is thrown a glamour, a tinselry, a love and a romance that is known at no other period.

Hereditary tendency is strong in these cases, but the factor of great importance is the question of environment and rearing of these children, neuropathically inclined from birth. Too often we can observe that the parents are unable to master or control themselves, and it hardly stands to reason, therefore, that they can by example and precept control those whom they have brought into the world. The pedagogue to whose the care of the adolescent of neuropathic tendencies is committed should be the one to appreciate the need of not overstraining the weakest point. They really need more than instruction, for it is essential that their mental, moral and physical conditions be kept constantly in view. Any tendency toward the forcing education of the present day, in which the receptive, emotional and intellectual parts of the brain are overtaxed or in which the child is allowed to engage in competitive contests, will likely end in disaster. Each of these brains is a separate study unto itself, its capacity of receiving so much education and no more, and beyond this potentiality no step should be taken, for it will result in exhaustion. This applies with equal force to the motor areas of the brain as well, and for this reason all over-exertion in athletics should be forbidden and their use curtailed within most reasonable bounds. With the advent of puberty in the male great care is to be exercised to prevent the youth from obtaining false and peculiar ideas of himself or his relations with the opposite sex, and he should be taught the truth concerning the functions of reproduction. He must be particularly protected at this time from evil companions, from the use of tobacco and spirituous drinks of all kinds, seeking early hours for retirement. Mawkish sentimentalities, foolish love affairs, eccentricities and overweening egotism are to be promptly checked. The girl should not only receive the same general restraint and teaching, but in addition be carefully watched and treated at the time of the inception of the menstrual flow. It seems needless to say that these cases in either sex should never marry, owing primarily to their own condition, and secondarily to the fact that they have no right to propagate and bring forth offspring whose span of existence is perforce puny and short-lived.

Dementia precox, as a rule, develops gradually, the most notable feature being an incapacity of the child to keep up with the tasks allotted. At this time he is apt to become listless and irritable, losing interest in his work, in his friends and in his pleasures and enjoyments. This may last a number of years, depending somewhat upon the age at which the disease commences. Later he begins to develop

peculiarities, eccentricities and a notable weakening of the mental faculties, especially the ability to concentrate attention, to memorize or remember. He may have many symptoms that are generally diagnosed neurasthenic, especially the head fullness, pressure, insomnia and mental depression. Delusional states are apt to occur, especially of persecution, believing that people are trying to injure, watch or speak of him. He lives in an atmosphere entirely his own. Later he may become violent and destructive, or may attempt to injure some one, at which period it becomes necessary to remove him from home. Institutions usually present cases that wander aimlessly about, or sit all day staring at some object, picking at their clothing, or muttering to themselves and occasionally breaking out in silly laughter. Cases usually present depreciated general health; the reflexes are exaggerated; sleep usually upset; appetite, digestion and elimination poor. Auto-toxemia is present, arising from a failure of the excretory organs. The restraint that institutional treatment imposes usually brings about quiet, followed by a gain in flesh. The termination is partial or complete dementia, which may last for years. The pathology of the trouble is unknown, but it is believed to be a congenital defect. The prognosis is unfavorable, taken as a rule. A small percentage get well, others have remissions and remain partially well for years, but the majority pass into a state of dementia and remain so until carried off by some intercurrent disease.

The treatment of dementia præcox should start with the child in the endeavor to prevent the commencement of the disease, and to this end those who have a strong psychopathic heredity must be reared along the lines laid down in another section, especial care being taken with their environment and studies. Should the disease commence, the patient must at once be removed to some institution well equipped for the treatment of these cases, where he will be under the supervising care of some one acquainted with the proper management of such cases. Rest, fresh air, restraint, over-feeding and hydrotherapy form the best method of treatment. The author has in several instances satisfied himself of the great efficacy of hydrotherapy in these cases, utilizing full treatment. Commence with the electric light bath or hot-air bath until perspiration takes place, followed by the horizontal or circular rain bath at 100° to 104° F. for two minutes, reduced to 80° F. for one-fourth minute, pressure twenty-five pounds. Reduce the temperature one degree daily until 65° F. is reached. A gain in weight is always a sign of improvement if the treatment is started early. A remission having taken place, the case should continue under the watchful care of the physician, and on the slightest evidence of recurrence treatment is to be repeated, and in this way the patient can frequently be saved many years of usefulness or semi-usefulness. This method will at all times prevent

many of the violent outbreaks that occur. Once dementia has set in, treatment resolves itself simply into that of custodial care.

Paresis.

General Paralysis of the Insane; Dementia Paralytica; Paretic Dementia; General Paresis.

Paresis is a subacute or chronic cerebral disease, degenerative in character, sometimes involving the spinal cord, of gradual onset, characterized by the development of tremor, slurring speech, pupillary changes, ataxia and trophic changes, with alterations in the intellectual and moral character, accompanied by unsystematized ideas or delusions of an expansive character, terminating usually in dementia.

It is considered a disease of modern civilization, built upon a syphilitic basis. It seems to be rapidly on the increase, and is much more commonly seen at the present day in its early stages, probably owing to its being better known and the diagnosis more frequently made. It occurs usually between the ages of thirty and fifty-five years, more frequently in the male than in the female, and in those who are usually strong and robust. Kraft-Ebbing states that its increase is in proportion to "syphilization and civilization." This is probably borne out by the relation between the sexes affected—men five, women one.

Of the predisposing causes other than those mentioned, over brain strain with under-brain power is a powerful factor—that is to say, forced intellectual activity in those who have imperfect or improper early training and whose cortex is not highly enough organized. The terrific strain incident to the ambitious pursuit of learning and wealth is frequently the basic cause. "General paresis is not a penalty of high cerebral development, but the expression of a discrepancy—an inadequacy of some brains to sustain the strain to which the race, as a *whole*, is subjected."[7] There is no question but what the excessive indulgence in alcoholic beverages is a powerful influencing cause in the development of this disease, as it aids in producing the same character of lesions that accompany paresis. "An almost sure recipe for producing a case of paresis is this: Let a man of nervous condition acquire syphilis, between the ages of twenty and thirty, then let him work as hard as possible without vacation, under great mental strain, drink a great deal of alcoholic drinks and indulge excessively sexually. This will be pretty sure to bring on paresis in ten or fifteen years."[8] Most alienists are of the opinion that paresis is changing, and that it is becoming more a disease of the brain and spinal cord proper, rather than a mental disease. The disease usually

7 Spitzka, E. C.: "Insanity," 1899. Paresis, 178.

8 Dana, C. L.: "Text-Book of Nervous and Mental Diseases and Psychiatry," 1904. Paresis, p. 457.

commences as an alteration in habits and the "ethical sense, which lies on most civilized human characters like the bloom upon the peach, indicative of the highest culture and varying in each individual with the social station, sex, age, race and nationality."[1] The character of the individual undergoes a change, in which spells of irritability or periods of elation occur, accompanied by an egotism shown by the exalted opinion of his own attainments. He may become boastful, forgetful, untruthful, dishonest, neglecting his family and business, making foolish purchases and oftentimes entering into propositions based upon an idea of his excessive wealth and capacity. These conditions are usually rarely appreciated by the family, but in a short while the symptoms become so marked as to demand serious interference. Moral lapses are most frequent during this stage, the most common of which are drunkenness, theft, assault upon individuals, the use of profane and vulgar language in excess, and a tendency to quarrel and assert himself. The physical symptoms at this time are characteristic—there is tremulous handwriting, so marked at times as to be illegible; the facial muscles present a distinct tremor, especially if they are placed upon a stretch, this same tremor being present in the tongue; speech is thick, slurring, and lapses occur; the reflexes are exaggerated; pupils irregular, react badly to light, or present the Argyll-Robertson form. As the disease progresses it may pass into the maniacal stage, in which he is excessively restless, boastful, with typical delusions of grandeur. He is sleepless, noisy, destructive, violent, and has various outbreaks of temper. The terminal stage is that of dementia, in which the mind becomes more or less of a blank. The day, the month, intimate friends or current events are unknown to him. He finally becomes careless in his person, must be fed and cared for as if he were a child. This stage is interrupted by apoplectiform attacks, which may be followed by paralysis or cause his death. Exhaustion finally closes the scene. The duration of the disease will average, when unchecked, from three to three and one-half years, although many cases remain alive for many years after the period of dementia—a living death.

The importance of early diagnosis cannot be overestimated, and for that reason the general practitioner, who is the one that mostly errs in this direction, should always be on the lookout for those symptoms that would characterize this disease in its early stages—specific history, facial and tongue tremor, disturbance of speech, exaggerated or lost reflexes, pupillary disturbances, mental disturbances of which a change of character, loss of memory, exaggerated egotism, are the most prominent; changes in handwriting, convulsive and apoplectiform attacks.

The pathology of the disease is degenerative in character, the

[1] Gray, L. L., "Neurasthenia and Mental Diseases," 1905, Philadelphia, p. 187.

microscopical appearance of which is that of a low-grade inflammation, accompanied by a thickening of the membranes and arteries, with an increase of perivascular tissue. In this disease, as in locomotor ataxia, the cell degeneration precedes the increase of tissue formation, the degeneration being the result of the previous syphilitic infection—that is to say, a wreckage left in the wake of the storm.

"The prognosis is said to be invariably bad. If one sees the patient, however, in the early stage and removes him at once from all forms of excitement, and makes him live quietly for a year, using anti-hectic or tonic treatment, one can sometimes check the disease, at least for a time. I have several patients who seem in this way to be apparently cured. When the disease has well entered upon its course it is incurable by any means yet known. It is probably true that the disease shows remissions oftener than it used to do, although it is less refractory to treatment than it was formerly."[16]

The treatment of paresis, therefore, resolves itself into the treatment of the earlier stages, when, according to Dana, and in accord with the author's own experience, the patient can be saved. Four cases of this character in the author's experience had led him to seriously doubt the diagnosis of paresis, although the cardinal symptoms were present, until he had read Dana's experience. The diagnosis made, we should at once commence the administration of mercury and the iodides. The author has a preference for the hypodermic administration of mercury, the bichloride or salicylate, rapidly increasing the doses until the patient is brought plainly under its influence. Internally, large doses of the iodides, well diluted, should be given and rapidly pushed to the highest possible point. In association with these medicines, tonics and digestants should be employed. Feeding is an important item, and super-alimentation is advisable, supplementing the usual meals by the use of milk, cream, plasmon, koumyss, etc. The patient is to be taken from his occupation, given mental and physical rest, together with moderate exercise in the open air, it being especially necessary to free him from excitement, worry and care. It is better for the patient to leave his home surroundings, in which annoyance is sure to be present. During the time of the initial treatment his best interests are served by treatment in some sanatorium, where his case will be given constant personal supervision. As soon as a remission takes place, due to the result of the rest, quiet, regular feeding and monotony of sanatorium life, he should be sent to the country and kept there for a period ranging from six to eight months, thus spending about a year in combating the disease. As hydrotherapeutic measures have such a powerful influence in combating the effects of the toxins of syphilis, this should be instituted immediately in connection with the internal medication. These cases, as a rule, can be at once placed in sanatoria, where they should receive

16 Ibidem, p. 154.

powerful eliminative and tonic treatment, the best of which is the electric light bath or body apparatus of superheated dry hot air, being allowed to remain within the bath until profuse perspiration takes place. In the electric light bath this generally requires from ten to fifteen minutes; in the superheated dry hot-air treatment the patient can profitably remain for one hour. Then give the circular or horizontal rain bath at a temperature of 100° F. for one and one-half minutes, pressure twenty-five pounds. Reduce temperature to 70° or 60° F. for ten to fifteen seconds. After a few treatments of this character have established the reactive capacity of the patient, we may add to the bath the cold jet under a pressure of thirty pounds for ten to fifteen seconds, applied up and down the spine, taking especial care to administer this in the cervical region. The Turkish bath, for the reasons here mentioned, has gained some little reputation for its action in cases where active elimination of this kind is needed, but the author is of the opinion that while the bath may be of considerable value, it labors at a disadvantage, owing to the fact that its application is in the hands of untrained attendants who are not under the guidance of the modern hydriatist. Associated procedures of value are massage, galvanism, vibration and the static wave current.

When a patient has once had such a warning he should so conduct his life and living as to limit his work to the essential necessities of existence, and should twice a year subject himself for periods ranging from four to six weeks to anti-luetic and hydrotherapeutic treatment. Vacations should be taken and alcohol, tobacco and all excesses eschewed.

CHAPTER XX.

DRUG HABITS.

Morphine, Cocaine, Chloral, etc.; Cannabis Indica; Hasheesh.

In all countries, in all climates, in all tribes and races, certain substances classified as stimulants and narcotics are used, and so common is the practice that it may be said to be universal. These substances are poisons producing more or less profound physiological effects upon the organism, and are usually taken to produce a feeling of comfort. In small doses ideation and pseudo-creative function seem to be increased, and fancy, fore-free, produces a joyousness and thoughtlessness, unhampered and undepressed by the wearing cares or the warping canker of the daily grind for existence. In larger and fuller doses the narcotic influence becomes more predominant, and the correct relationship of the world at large is disturbed, pleasurable sensations engendered by retiring the individual into a dreamy self-centered world of his own, the return from which is disturbing and irritating. Savage and civilized humanity both delight in partaking of those stimulating and narcotizing products, that will eliminate pain, replacing it with pleasure, and any drug possessing the power of Aladdin's lamp becomes a menace and a danger at all times and under all conditions, for I maintain this to be true, no matter how much we may repeat the contrary and how often we may absolve our consciences. Particularly should this be borne in mind, that pain is real, patent, positive, an imperative call for absolution; while pleasure is purely negative as compared to pain and a resultant of negative factors. Pleasure depends so much upon perfection of functional activity of the body and mind, of surroundings, of temperamental conditions, as to place solidly before us the picture of complacent good health, while pain becomes the potent indicator of ill health or disease. It has often seemed to me that it is the desire to imitate the feelings of health and strength, the well-being and happiness of perfect functionation, the bodily strength and mental activity that compel many to continue to use, and finally to abuse, alcoholic drinks and narcotic drugs. We cannot blame the ill, when in many countries the tired, the hungry, the thirsty, the suffering, the depressed, can, as DeQuincy said, "Carry Paradise in the pocket for a penny." Painful factors are unquestionably at the bottom of a great deal of the use and abuse of narcotic drugs. Painful conditions wear upon the reserve

strength, weaken mind and body, lessen muscular power and capacity, depress the circulation, producing gloomy and melancholy mental impressions.

It should be borne in mind that pleasure and pain are not separate entities depending upon social status, upon surroundings, education, habits or training; are not limited to any social class or financial condition, and it is a noteworthy fact that the larger number of habitués (excepting possibly the Southern negro) of morphine are to be found in the middle and upper classes. Physicians, the cultured, the literary and artistic classes, yield a large percentage of cases, owing to an over-endowment of nerves or because of neurotic inheritances. From their occupation or by tendency they are subject to uncomfortable and painful conditions—notably insomnia, neuralgia, rheumatism and pains of all sorts—and to these the "hypo," with its relief, is a dangerous spark that may ignite a vast conflagration. Relief is frequently purchased, but it is short, and the temporary surcease from pain and sorrow by the use of morphine and other drugs is nearly invariably followed by a reaction that increases the misery and intensifies the suffering. There is no more curious paradox than that of drugs, the principal value being that of a pain reliever, acting as the direct cause of pain perpetuation, and it has often seemed to me that pain relieved and soothed by morphine and its congeners actually becomes worse upon cessation of the drug, largely by contrast, if I may so describe it, just as black looks blacker on a white background. It is this over-relief that constitutes one of the great dangers of drug therapy. The cases in which it is frequently administered are those of functional pain, especially of paroxysmal character, and in which there is an apparent need for temporary and immediate relief. I have noticed that painful states in these people are influenced by barometric changes, and that when there is a lowered change they are apt to increase the dosage. Morphine and similar drugs are great obscurers, hiding real states of disease, both functional and organic, and certainly obscuring the diagnosis of the physician who administers it.

The principal action of these drugs is upon the nervous system, and those who are unfortunate enough to be addicted to their use realize fully the inevitable law of action and reaction with regard to nervous states. Upon ideation their action depends largely upon the personal equation and temperamental peculiarities of the individual. Thus the dreamer and imaginative person soars to realms of fancy, peoples them with imaginative persons, and rising above the mean level performs deeds of heroism and valor, or becomes a prince of good fellows around the festal board, or controls the destinies of nations; others become placid and dreamy, and there flows through the mind pleasurable facts, irregular and disconnected. Again, others are stimulated to the performance of tasks, literary or otherwise,

while still others dream of far Oriental countries and strange dark-eyed houris. Still another type becomes talkative and an agreeable member of every-day society. "Here was the secret of happiness which the philosopher inquired for so many ages at once discovered. Happiness might be purchased for a penny and be carried in the waist-coat pocket, portable ecstasies." (DeQuincy.)

Upon volition morphine has a marked effect, for few possess sufficient will-power and self-control while under its domination, and it were as unfair to ask the unhappy victim to call into play this attribute of the mind and to free himself of his enslaving thralldom as to ask the typhoid patient to dispense with the febrile manifestations of the disease from which he suffers. Truthfulness is affected; I have often weighed the question *pro* and *con*, and have concluded that the habitué is not really quite as bad as he is painted. There is a large percentage of these cases who deplore the burden that they carry, and who are not degenerates or inveterate liars, nor do they deserve the reproach and condemnation that is often heaped upon them, for frequently the habit has been acquired from no fault of their own, and they are unable to erase its use because they are controlled by forces beyond their capacity to resist. I should say that *all statements made should be carefully weighed, not because of an inherent desire to lie, but because, in my opinion, the habitué at times lacks the true qualitative and quantitative appreciation of his surroundings and actions.* As the habit becomes confirmed the excitation and pleasurable features diminish, and the use of the drug becomes necessary in order that suffering may be abridged, that the daily tasks may be performed, and at the same time to escape the misery that its absence entails. Thus fresh doses are taken and a fresh lift given, another fall, another lift, and so the story goes, as did the brook, until something happens to change the sluggish stream and make the unhappy victim yearn to break the enthralling chain.

Curiously constituted nervous systems exist on every hand, and with the increasing strain of modern life it is not surprising that these peculiarly constituted organisms sometimes acquire the morphine habit in the twinkling of an eye, and I know of a number of cases in which the addiction dates from a single attack of less than a week's duration. These drugs are usually solitary indulgences taken in seclusion. It should be distinctly understood that in this country the solitary use of these drugs is not purely to secure pleasure. These cases endeavor, as every reasonable human being would, to keep the skeleton in the closet; trying to present as good a face in public as possible. I take it that every one is justified in self-protection, and it is a notorious fact that these people are morbidly sensitive and do not desire to lose the good will, respect and confidence of their family and friends. Applying laws and rules to this disorder that we would to other diseased

conditions, let me ask, would one parade a specific or tuberculous affection to the gaze of the world at large, and would he be considered a pervert, scoundrel and liar for not doing so? And yet these people act simply as you or I would act under similar conditions with other diseases. There is no question but what the general opinion concerning the use of narcotic drugs has been based and framed upon that proportion of cases who show absolute disregard for all the proprieties and ethics of life and who publicly parade their condition. They are morally degenerate, and would be so regardless of their use of drugs. I have seen cases who have used narcotic drugs, and whose use of them has never been suspected by the public, maintain self-respect, business honor and integrity, and who are highly regarded in the community in which they live. These cases are those who have had moral and proper training before the acquisition of the drug.

Briefly passing to the influence of these drugs upon the general system, it may be said that their action is functional, deranging secretion, perverting elimination and generally retaining poisons within the body. They have an especially pernicious influence upon the appetite, and by depriving the system of food and the heat-generating energy that arises from food, cause tissue loss. Metabolism is lessened and tissue waste retained, and with the absence of proper nutriment in the blood stream failure of repair takes place, for in the absence of sufficient nutriment the body feeds on its own tissues and loss of weight is a consequence. By diminishing irritation they somewhat lessen wear and tear, but at a cost not to be considered.

Physicians form quite a large class of drug users, strange as it may seem, when they know fully the dangers, both to themselves as patient and as medical advisers to others. The life of a physician is a hard one, and a large percentage are either neurasthenic or neurasthenoid one-half of the time. The incessant demands day and night, the loss of sleep, the physical strain, the mental worry, are so harassing and burdensome that after the wear, tear and exposure incidental to their lives acute mental and physical tire is produced. Then comes a tiny dose to "tide me over." A false and frantic endeavor to escape by this means Nature's inexorable law leads to the formation of the habit. In a large experience with doctors I think I can truly say that they can stand less pain and suffering than almost any other class. A drug habit is an imperious mistress that cannot be easily shaken off, for by slow degrees and insidious steps she becomes the dominant influence of the being's existence. It creates an appetite for itself with a yearning and desire on the part of the nervous system for repetition. It is astonishing to what extent, by gradual training, the system can become habituated to the large doses some patients use. It almost baffles belief at first sight.

From a careful study of case-records the author is constrained

to believe that the most prominent starting-point of the habit has been the medical use or the medical prescription. I cannot, in measured terms, condemn too hastily the medical member who consents to or places the hypodermic syringe in the hands of the patient, and as the commonest demands for its use are pain and insomnia, I again say that it is a fatal carelessness that would permit its use, save to open the fields of euthanasia in hopeless disease. Where is the vaunted responsibility, the higher ethics, the plain home-made honesty? Have they become drugged and anesthetized under a case-hardened conscience?

There are two great classes in which, *for convenience only*, I would divide those addicted to the use of narcotics:

1. Those who have become habitual users through pain, suffering, etc., and have acquired the habit through medical use or necessity.

2. Those who use them purely as a means of gratification or dissipation.

This division, *clinical in character*, has much to do with the treatment and prognosis. In the first class—and I am happy to say that they form the larger body—we find those who have acquired the use of drugs through the actual prescribing, advice or sanction of the physician himself. Many patients suffering from this affection tell of the hypodermic as a starting-point for the temporary relief of rheumatism, neuralgia, neuritis, headaches, insomnia, and many others in which the use of such methods were needless, valueless and dangerous. It is to be regretted that its use is often substituted for a real diagnosis of conditions and as a therapeutic means requiring no great understanding of the pathology of the case. Into this class most of the physicians fall, and I am constrained to believe, from a somewhat extensive experience and confidential knowledge, that physicians form about one-fourth of the narcotic drug-users. Can it be that a physician who uses morphine, drugs or alcohol learns easily to rely upon them, and upon the slightest provocation takes them himself?

The second class is formed by those who love the stimulant and narcotic *per se*, who do not desire to quit, who seem to fail to recognize all that their condition means, in whom the desire does not exist to escape thralldom, but seem to revel in the pleasure and joy the drug gives and long to continue its use. Pride, conscience, the higher mental and moral attitudes, seem to be lost, and, reveling in a dissipation that nothing will stop, they drift slowly down stream to the bosom of the great ocean of the "other half," to be later cast upon the shore, the flotsam and jetsam of a lost life. These are the cases that are brought to us by parents and friends who desire to escape the degradation that has been forced upon the family.

Occupation and mode of life have a good deal to do with how drug addictions are borne, and influence markedly their effects. The

worst results are seen in those who lead sedentary lives and take little fresh-air exercise, and for this reason and others the worst cases are seen in women and those confined indoors. The laborer, using his muscles in the open air all day, can consume more alcohol and take more morphia with less deleterious effects than the same individual under close housing conditions.

Where opium and its congeners are taken *per os*—that is to say, "eaten"—it is much slower in its effect. My observations lead me to believe that the hypodermic administration leads to a more speedy and permanent addiction. I have never been able to distinguish much difference between the fluid and the solid preparations of the drug, they being about the same in their action. The main difference in this method is the gastro-intestinal disturbances. Opium when smoked is quickly absorbed, and is less injurious because only limited quantities can be inhaled in a given time. This method is the far Eastern one, and is not generally used except in the larger cities in the country.

The "popularity" (?) of morphinism and cocainism has largely been due to the rapidity and certainty of the results obtained from their subcutaneous use. That modern blessing and pest, the hypodermic syringe, enables the user to carry in a small space all his needed impedimenta. It is interesting to observe the rapidity, accuracy and dexterity obtained by the users of the drug in hypodermic administration. The favorite seats of administration in men are the arms, and for obvious reasons the legs in females. Many utilize the extremities during the day and the trunk at night. While narcotic drugs are still taken by the mouth by quite a large number of habitués, still the hypodermic is the commonest method now practiced. That the consumption of morphine, cocaine and allied drugs is annually enormously on the increase is attested by the stupendous increased consumption of these drugs, and this is not due to legitimate medical usage, but is unquestionably so through the purchase by laymen and those addicted to their use. It may be that the calm temperamentality possessed by the Eastern and Indian peoples may account for the moderation found in the use of opium in those countries, but the Anglo-Saxon seems peculiarly prone to its excessive use. This abuse, if we are to believe the authorities of various countries, is greater in America than in England. A really explanation may be found in the difference in climatic conditions and in the strenuous struggle that marks the lives and existence of different nations. In the Eastern peoples hereditary attenuation may possibly be a predisposing factor in preventing excessive intoxication.

No pathological anatomy of a distinct character has been found in this disorder, all observations pointing to a tissue starvation, inanition, and lack of nutritive processes. This is really the general appearance in health, and we may state that "drugism" presents no

distinctive pathological anatomy, but its action deals with function only. This is an important matter to bear in mind, as it influences largely the question of prognosis and restoration. What, then, is the essential pathology of the conditions? In my opinion, it is a toxæmia presenting two distinct phases of poison, each closely correlated to the other. The first is an endogenous, internal or auto-infective process arising from the waste products in the system due to imperfect, defective and inadequate action of the excretory organs of the bowels, kidney and skin; to lessened and weakened circulation, improper metabolism and defective nerve function. The second, an exogenous, external or foreign poison (morphine, cocaine, etc.) introduced by mouth or hypodermically, daily or at short intervals, producing its own peculiar intrinsic action upon the skin, bowel, kidney, circulation, tissue change, brain and nerves, and enhancing the poison mentioned in the first class.

When we stop and reflect that in the process of digestion of foodstuffs toxic material is produced, and that there arises a necessity for healthy glandular action to counteract them, and by which poisons are nullified, it must become apparent that if this be true of health, what must be the condition of affairs when there is superadded poisons which lock up the natural secretions of the stomach and intestines and prevent the elimination of the toxic product already present? This is particularly true of those poisons that come from albuminous foods (meats), whose tendency towards the production of toxins and katabolic waste material is well known. In my own mind I feel satisfied that with this condition as a working basis we can remove many of the most disagreeable and dangerous symptoms, such as shock, heart failure, diarrhea, collapse, etc., by the removal of the toxic condition prior to the entire withdrawal of the drug itself.

In this connection I may state very frankly that I do not blame habitués for attempting to secure the drug, for my observation is that most of them believe that death or insanity will be their lot unless proper help is obtained. This, in many instances, is based upon a personal experience of attempted withdrawal of the drug by the patient himself or by well-meaning friends and relatives. When the drug is quickly reduced or entirely removed without sustaining and appropriate treatment we may expect the sufferer in a few hours to complain of a general and gradually increasing weakness, accompanied by excessive nervousness and restlessness; in a short time, great distress, accompanied by weak and constricted feelings about the heart and chest, the latter frequently attended by a cough. A gradual increase of all these symptoms, together with persistent insomnia and many hallucinations and muscular twitchings, ensues. A constant and disagreeable yawning and sneezing, together with a

drawling voice, are usually found. The prostration usually reaches such a point that the patient takes to his bed and complains of racking pains in the back and limbs, especially in the calves; many state that the muscles feel as though being torn from their sockets. The appetite is lost and the stomach becomes excessively irritable, nausea most disagreeable and persistent, to which latter is added a weakening and prostrating diarrhea. The heart's action is weak and irregular, and may intermit; the pulse small and thready. With this brief resume of the disagreeable symptoms that attend the improper withdrawal of the drug, the habitue cannot be blamed for objecting to its withdrawal or endeavoring to secure the drug that will alleviate his suffering. With the proper withdrawal these symptoms do not occur, or, if they do, should be very mild and transient in character.

Treatment is not easy, but those cases that belong to the first division of the clinical classification above mentioned may expect complete relief and cure with comparatively no suffering. A frank, open talk, making the patient fully acquainted with the manner and method of relief, has much to do to secure confidence and imbue hope, and this feature of the case is an essential and necessary one. Has it ever occurred to you that these people have been the outcasts of medicine, without hope, spurned and derided as lacking in all the higher mental and moral traits? To give them hope is to give them courage, and I say candidly and advisedly to not recognize them as diseased is to reflect upon the intelligence and capacity of those who make the statement. Let us give them hope, the greatest of all stimulants, and a gift that the Deity has offered unto all mankind. Be not uncharitable to their faults and sufferings, deal kindly, thoughtfully and patiently with them, and you will become their anchor of hope. Rob them of this and their strength and vigor are gone; with it they fight the battle better and more gloriously. It has always seemed to me that one of the essential features of the treatment of this class of cases is the physician himself. He should not only be healthy—*mens sana in corpore sano*—but should be a non-user of all drugs, should not use alcohol, and should preferably be an abstainer from the use of tobacco. This is a personal part of the equation that a physician who treats these unfortunates should keep in mind.

There is a powerful and stimulating psychic factor in the presentation of the problem, "Do as I do," to say nothing of the large element of voluntary submission that inevitably falls from a contemplation of this factor. No man can truly occupy a judicial position who is a law-breaker, and no physician is qualified in this particular line of work who is a drug-taker. Under this term I include the use of liquor.

Having thoroughly understood each other, and with confidence in each other, what, then, are the necessary steps to the management of these people? I would divide the treatment into three stages:

1. Preliminary or preparatory stage.
2. The withdrawal of the drug itself.
3. Convalescent or recuperative period.

A most careful preliminary examination must be made of each and every one of these cases. Elimination can be heightened by the drinking of large quantities of pure water. I know of no mineral water that is of value in these cases. If laxative medicines are needed I generally confine myself to the well-established action of cascara sagrada at bedtime. These cases can only be treated in sanatoria.

We may at once, in the majority of cases, commence with the electric light bath or superheated dry hot air, continuing this for the first few days until the patient just perspires, thereafter using it until profuse perspiration takes place. This may be followed by the horizontal or circular rain bath at a temperature of 102° to 104° F. for two minutes, reduced to 85° for one-quarter minute, pressure twenty pounds. Decrease the temperature of the cold water three degrees daily to 65° F. and increase the pressure one pound until thirty is registered. It is often astonishing how these patients clear up under this treatment. Hyperesthetic impressions traveling from the periphery to the center are lessened, nerve tone improved, circulation bettered, elimination hastened, appetite improved, respiration increased, and the dry and harsh skin made to become succulent and eliminative in action. It is by this means that the internal toxemia is rapidly and satisfactorily removed. Note should be taken that for the first few days no attempt is made to reduce the quantity of the drug taken, but reduction is reserved until the patient's reactive and recuperative entities have been stimulated.

In some cases it is advisable, before taking the next step in the treatment, if possible, to add to the above treatment a very brief application of the spray douche to the entire body for five to ten seconds, and the jet douche for five seconds to the spinal column, both at a temperature of 65° F. In no class of cases is it more necessary to secure reaction than in these habitués. The drug is gradually reduced until practically none is taken, at which the patient is put to bed and kept there. A special nurse is placed with him and remains with him night and day. The treatment of this stage is largely that of the Weir Mitchell rest cure, which has been elaborated in another section. In the application of this method of treatment the diet should be liquid, supportive, and from which all meats have been eliminated. Tonics are continued, and neuro-cardio-vascular support given by hypodermic administration of well-known remedies of this class. The schedule

starts with the dripping sheet in the morning before breakfast. As the patient's reactive power has become well established, we may at once commence with a wet sheet at a temperature of 60° F. for three minutes, accompanied by vigorous friction while the patient stands in a foot-tub of as hot water as can be comfortably borne. During the day massage and electricity are used. At night, one hour before bedtime, the full wet pack at a temperature of 60° F. is used, which will have a decided tonic, quieting and soporific effect. If it is accessible, we may employ the neutral bath at 96° to 94° F. for twenty to forty minutes, and this bath will be found of unusual help and comfort. Should the patient at this stage complain of *localized cramps or pains* in the muscles, especially in the calf, we may apply the fomentation over the area affected; it will give almost immediate relief. Should *insomnia* accompany the condition, nothing need be given save the wet pack or the neutral bath. For the *nervousness, restlessness and "indescribable sensations,"* the author has found nothing that compares with the neutral bath, and if this is not accessible the next thing to be used is the dripping sheet or the full wet pack. *Cardiac weakness* is best met by means of the ice-bag applied over the precordial region for fifteen to twenty minutes. Should this condition continue, its application may be interrupted for a very brief application of a hot compress, to be in its turn succeeded by the ice-bag. For *the pain* occurring in *the spine* and lumbar muscles the alternate hot and cold sponge will give almost instant relief. *Vomiting* should be met by lavage, the swallowing of small pieces of ice, and the trunk compress at a temperature of 65° F. for one to two hours, or the use of Neptune's girdle during the night. In like manner *diarrhœa* is to be overcome by the hot saline enema, followed by the trunk compress or pack. It may be stated, however, that where the preliminary treatment has been thorough few of these symptoms will arise.

It should be noted in passing that at this stage of the game we have our patient in the most favorable surroundings. With practically no discomfort, with the moral help and support that a nurse and physician can give, he knows that it is only for a comparatively few hours that a strain must be undergone. The continued sedation and neural strengthening that come from the administration of the non-medicinal remedies make his condition at this period a very pleasant one as compared with the horrors generally depicted or believed to exist; and, in addition, we do not have to deal with the delirium that accompanies the administration of hyoscine. The duration of this stage is usually short, and with the complete withdrawal of the drug it is astonishing how quickly appetite returns, digestion improves and the cloaca regulate themselves.

The third or convalescent stage embraces a period that is difficult to estimate, but, in my opinion, should never be less than four weeks.

preferably six. The convalescent period is largely a resumption of the preparatory stage—that is to say, the use of tonics and the administration of the various non-medicinal measures with a view to the stimulating of the functions of the body and removing them from the warped habit of action that has, as a rule, constituted their condition. During this stage hydrotherapy should be vigorously pushed, and the treatment recommended in the first or preliminary stage, consisting of the electric light bath to perspiration, the circular or horizontal rain bath, fan and jet douche administered every day, vigorous reaction being secured.

Before the patient is dismissed all medicinal treatment is stopped, and he is impressed with the idea that he does not need drugs of any kind or sort, and that for him the resumption of medicinal measures is dangerous because of their subtle suggestiveness and because of the previous association of morphine with the idea of drug taking.

Upon their dismissal patients must keep in close touch with the physician, either by correspondence or personal interview, and I think that where this is maintained for quite a little while the "cure" is, as a rule, better and more satisfactory.

It is my universal practice to suggest to these cases that they continue tonic hydrotherapy in their homes upon the resumption of the duties of life. I am satisfied that if these cases practice the daily use of the cold sponge or the cold shower bath, it will be found that they are less likely to relapse, for it is a fact beyond question or peradventure that the vasomotor system must be kept in tone for months in order that no relapse occur, and that where this is done they generally retain good health and no cause arises for a relapse. The same advice may be given that should be given every individual in health or out of health, and that is that tonic hydrotherapy is indicated and needed as a part and parcel of their daily existence.

I think that the majority of thoughtful men will agree with me when I say that personality has a great deal to do with the successful management of these cases, probably as much as in the management of the hysteric. Judgment, tact, patience, thoughtfulness, attention, faithfulness and kindness are great levers by means of which we can attain the end.

Tobacco Habit.

Tobacco consists of the dry leaves of the *Nicotiana Tabacum Linnæus*, one of the order of *Solanaceæ*. It is a rank, viscid, hairy plant, two to four feet in height, with coarse alternate leaves, having a disagreeable odor and taste, and turning brown on drying. It is indigenous to America, but is now grown over the entire world. The seeds are first sown in beds in the early spring and are then transplanted, and after growth the flowering tops are cut off so as to en-

courage the spread of the remaining leaves. In August or September the leaves are gathered, dried under cover, then piled up and allowed to ferment or "sweat."

Tobacco is familiar to every one and needs no special description, its only important active principle being nicotine, which is present to the extent of from 1 to 8 per cent., in combination with citric and malic acids. Opposed to the popular idea, nicotine is a volatile oily fluid, soluble in water, and when fresh nearly odorless, colorless and tasteless. Its chemical structure is not known with definiteness, but is supposed to be $C_{10}H_{14}N_2$. Besides nicotine, dry tobacco contains pyridine, other decomposition products, and an oil which is of importance, as it determines the flavor.

Tobacco has been investigated chemically and physiologically repeatedly, and the more recent results of such work have shown that its deleterious effects are not due entirely to nicotine, but to the decomposition products, more often pyridine. This is the black oily juice which collects in the stems of foul pipes, is often taken in when the pipe is again smoked, and is shown to be extremely poisonous. The cigar smoker has the nicotine and pyridine partly evaporated and partly broken up in the burning end of the cigar, to be recondensed and deposited in the stub end of the cigar which is thrown away. Of the various methods of use, the pipe is the most deleterious; the cigar next, and, contrary to the opinion held by the average layman, though true, the cigarette used in moderation is unquestionably the least harmful method of smoking. Cigarettes are so mild that the smoker is tempted to use a large number of them, and by this means constantly though slowly absorbs a great deal of poison. Another objection is the inhalation of the smoke. Their mildness leads young persons and women to use tobacco. The popular belief that cigarettes contain opium, and the rice paper deleterious substances, has little or no foundation in fact, when viewed either from a commercial or chemical standpoint.

What constitutes excess is a variable quantity. There are some individuals to whom the smallest amount of tobacco is excessive and seems to possess an injurious effect upon their systems. There are others who are able, with enjoyment and apparent immunity from evil effects, to smoke, chew or snuff tobacco, seemingly to live lives of length and healthful activity; these cases frequently consume tobacco during their entire waking hours. There seems to be no means of detecting the liability of tobacco intolerance, and some persons who are apparently possessed of very strong nervous systems seem highly sensitive to tobacco, my own observations being that high-strung, neurotic men, young people and women are more easily affected by its use. Be this as it may, the broad fact remains positively true that it is a potent poison, the effects of which tend to debilitate

the system, stunt the growth, and deprave the functions, and it goes without saying that a general abstinence from its use, especially by the young, would undeniably promote the health and strength of the population.

Every smoker is a law unto himself, and the quantity that can be smoked by one man may be poisonous to another, and for this reason each smoker has to estimate his own capacity and regulate the quantity smoked thereby. It is an astonishing fact that in spite of the deadly pallor, cold sweat, horrible nausea, vomiting and collapse which follows the first use of tobacco, that man, the highest animal in the scale of intelligence, will continue its use until tolerance is established. It is among the psychological curiosities that man would be willing to discipline himself in such an habituation. It is to be regretted that the use of tobacco, especially cigarette smoking, among girls and women in the middle and cultured classes, with its deletrious influence upon their more sensitive nervous systems, is constantly spreading.

It is interesting in the study of the tobacco habit to note the two extreme camps into which the parties divide themselves. On the one hand the "divine weed" has been denounced as the Satanic embodiment of all that is physically mischievous and morally deadening, while, on the other hand, it has been claimed to be an innocent, harmless, pleasing and comforting weed, which adds to the pleasure of many, injuring the health of none, and bringing blessings into the life of the "hard-working man." The truth probably lies between the two extremes; though not an innocent substance, it is a weed that permits some persons to smoke or otherwise use it without apparent disagreeable effects, distress or danger. Even the most habitual smoker may become a subject of tobacco poisoning when his health is run down.

The popular belief that cigarettes are the cause of many cases of insanity is exploded upon investigation. Hancock, in his report to the Massachusetts State Commission of Public Health, found upon investigating cigarettes purchased in the open market that the specimens contained no opium, morphine, or other drug or poison, but were found to consist of tobacco, nothing else; the papers were of excellent quality and free from metallic and other poisons. It is, in fact, a tiny cigar wrapped in paper for a few whiffs or a brief smoke.

Acute tobacco poisoning occurs most frequently in inexperienced and young smokers who have not thoroughly established tolerance of the poisonous effects of the weed, although the writer knows of several cases in which acute poisoning has arisen from breathing air laden with tobacco smoke. Severe cases of acute poisoning are extremely rare in spite of the extensive use of this luxury in its various forms. The symptoms of mild poisoning usually commence with a peculiar sinking feeling at the pit of the stomach, with clammy, coldish

perspiration, vertigo, tremor, increased salivation, vomiting and prostration. Severer symptoms are generally cut short because the smoker is deterred from further use of the agent or on account of the nausea and weakness. Where larger quantities are introduced the poisoning may pass to the stage of extreme prostration, abdominal pain, etc. The pupils are generally contracted, and in the later stages dilate. The pulse is nearly always rapid, small and weak. Some writers have noted that in extreme cases of poisoning convulsions have taken place, and that death occurred from the arrest of respiration.

The mouth, stomach and intestines are directly affected by the use of tobacco. Upon the saliva there is at the start a primary stimulation and increased flow, and later paralysis of the action of these glands in habitual users. By its close contact with the mucous membrane it has an irritating influence upon them, and the buccal-tonsillar-pharyngeal membrane usually appears reddened and congested, with an unusual prominence of veins. This is true of the nasal mucous membrane where smoke is inhaled and blown through the nose, or where snuff is used. Chewers oftentimes show the displeasing and in some instances disgusting effects upon the teeth, which become intensely discolored and are often worn nearly to a level with the gums. It has been claimed that smoking predisposes to cancer of the lip, but to this the author takes exception, believing that if it is brought about by smoking it is due to the irritation and to nothing inherent in tobacco itself. Upon the stomach we may get localized effects from swallowing sputum containing small bits of tobacco or impregnated with the smoke or toxic products of combustion. This is especially true of pipe and cigar smokers and tobacco chewers. As a result, tobacco users are frequent subjects of chronic gastritis, indigestion and other symptoms, of which hyperacidity, flatulence, weight, heaviness and a sense of constriction or tightness are most frequent. These symptoms are noted in those who are tobacco users alone, but are much more common where alcohol is an added factor. Tobacco has a mild laxative influence upon the intestinal tract, and this is often offered as an excuse by old smokers for a continuance of the habit.

Upon the respiration we find that its action is first quickened, while if from continued use poisoning results it becomes slower and slower. It is the arrest of respiration that causes death in lethal doses. Where the smoke of tobacco is inhaled its action is most marked upon the upper respiratory passages, showing chronic glandular inflammation, the larynx being especially irritated. Cigarette inhalers oftentimes show this phase of tobacco irritation to a marked degree, the cause of the irritation being due to the presence in the smoke of heat and other chemical irritants, the result of combustion. The author has seen a few cases in girls and women, subjects of this irri-

tation, due to the inhalation of tobacco dust while working in tobacco manufactories.

Upon the heart and circulation moderate doses cause a slowing of the pulse, followed by a return to the normal or to a rate slightly above the normal. The heart is slowed by the depressive and inhibitory influence coming through the vagus nerve and ganglia; later it paralyzes the centers and accelerates the heart's action through the sympathetic nervous system. Blood pressure is temporarily increased by tobacco, owing, it is claimed, to the stimulation of the vasoconstrictor ganglion cells, and the pressure may rise to two and one-half times the normal, the rise in pressure being due to paralysis of the ganglia. It would seem that constant repetition of this practice might produce widespread and serious effects upon the blood-vessels themselves. Because of the vascular contraction and peripheral resistance, the work of the heart is greatly increased, and we would expect cardiac hypertrophy, but the author's experience has been that this is not usually present in the habitual user. My judgment is that the constant user of tobacco is on the high road to deteriorating the muscular power of his heart, this being followed by dilatation. The way is long and the deviations many, but it is more frequent than is generally believed by medical men. It may, however, be stated that the majority of cases are "functional" in character, for on post-mortem pathological lesions are rarely found. Huchard[1] is, in the writer's opinion, correct in the statement that the constantly repeated rise of blood pressure may and does result in arterio-sclerosis.

The symptoms most commonly observed are those of the "irritable heart," associated with digestive and nervous manifestations, the most common complaint being pain in, over and around the heart, from the very mildest to severe attacks, that look like angina. These attacks are accompanied by pallor, cold extremities, sweating, muscular weakness, headache, and small, feeble and irregular pulse. Ordinarily physical examination of the heart may show nothing abnormal, although the commonest manifestations are rapidity, irregularity and intermittence, especially after slight exertion. The author has seen cases that presented such irregularity and disorder in rate and rhythm as to require most careful differentiation. One of the most common forms is two to three good beats, intermission, followed by three to seven quick, small and weak beats. Almost any form of irregularity may be present. At this stage blood pressure is usually low. In listening to the tobacco heart the experienced auscultator will have no difficulty in detecting a tobacco heart, for in addition to the above it will be noted that the heart seems to have a hesitating, faltered action or gait, entirely different from the ordinary heart beat of organic disease. These effects are much more pronounced in young

1 Huchard: Bull. Méd., Paris, 1889, iii, 843; Maladies du Cœur, Paris, 1889.

men, youths and women, owing to their sensitiveness to the products of tobacco combustion.

Upon the nervous system the first effect of tobacco is that of general stimulation, especially manifested through the respiratory and cardiac activities, heightening the cerebral functions, the lower brain centers and spinal cord; this is later followed by depression of varying degree. The use of tobacco, by its powerful depressant influence upon the motor centers, produces a more or less characteristic tremor, fine and vibratory in character. As a direct-active causative agent of functional nervous disturbances we may mention that vertigo is not an uncommon result of its use. Insomnia occurs with a fair degree of frequency, even in those who are constantly addicted to its use, and every smoker knows that a strong cigar often acts as an excitant of the brain. Neuralgia can occasionally be directly traced to the use of this weed, as can violent and alarming attacks described by Peter, and called "tobacco angina." Peter calls attention to the difference between this angina and the angina of true cardio-vascular disease, for no man in an attack of true angina writhes or moans aloud, nor does a true attack last long enough for maneuvres of this kind. The key-note of true angina is a terror-stricken stillness, the patient not daring to even breathe lest he may die in the act. Headache, muscular tremor and a state of general debility are not uncommon outcomes of the excessive tobacco use in the susceptible. Insanity has been attributed frequently to tobacco, especially cigarettes, but the author, from no small experience, can state that he has never seen a case, nor can he find any account in Kraepelin[2] of tobacco as such a cause; in fact, he says that he has never seen anything of the kind. In cases of insanity the influence of tobacco is probably secondary or simply cumulative, in that it assists other factors in producing a general physical and mental break-down.

There is no gainsaying the fact that there are a great many persons, cultivated, cultured and illiterate, but especially the two former, who derive great pleasure and mental satisfaction from the use of tobacco. Many who work with the head or the hands become irritable and rundown, so that anything, from the office to the simplest detail at home, seems to set them awry. In this abnormal psychological state tobacco seems to exert a soothing and sedative influence that is conducive not alone to his individual comfort, but to the happiness of those about him. In this wise tobacco does a good service to mankind. There are other individuals whose mental make-up is such that they have great difficulty in concentrating their minds and thoughts upon their work, and to these tobacco seems to arrest and focus the intellectual powers, so that they are capable of definite and satisfactory work. A number of writers, lay and medical, have assured the author

2 Kraepelin, Emil: "Clinical Psychiatry," 1904.

that without tobacco their best efforts would have amounted to nothing, and it may be said in passing that no other substance, narcotic or anesthetic, is yet known which would serve this purpose and do so little damage. This is a mere idea, the result of long habit. Most military writers admit that it is of decided value to soldiers, helping them to pass the time in monotonous camps; when exposed to severe weather and when food is scarce it acts as a preventive of the pangs of hunger. Many a soldier has testified, in language that inadequately conveys the idea, of the comfort, consolation and companionship the pipe has given when exposed to severe weather in the trenches, and it has seemed to the author from all the facts he can gather that tobacco, under these circumstances, has done little if any harm. Socially it is objectionable on account of its odor and the promiscuous spitting that is indulged in.

Upon the eyes the effect of tobacco is universally recognized, its action being to produce the tobacco amblyopia, amaurosis and dry conjunctivitis known as "smoker's sore eye." This amblyopia is of a specific type and is most common in men beyond the age of thirty-five who are smokers rather than chewers. There is a dimness of vision, and the patient frequently sees best at night and in a dim light. The most characteristic finding is a central scotoma for color, a condition which is almost pathognomonic of toxic amblyopia. The ability to distinguish colors is usually lost, first green, then red, and finally blue. The scotomata may later exist for form as well as color if neglected. This impairment of sight and color sense from the center through the whole of the nerve fibers leads rarely to absolute, yet generally to practical blindness. Tobacco amaurosis is the gravest of the mischiefs of tobacco.

The prognosis of the functional disturbances resulting from the over-indulgence in tobacco is usually good. The various symptoms of nervous depression, cardiac disturbance, weakness, palpitation and irritability rapidly disappear under the institution of treatment and the cessation of the use of tobacco. The amblyopia usually recovers completely if proper treatment is instituted early enough, but if the habit is persisted in a high grade of deficiency may become permanent.

The principles underlying the treatment of the tobacco habit are few and simple—cessation of its use, active elimination and tonic reconstruction. The author has never seen the slightest harm result from the immediate cessation of tobacco, and in those who may be denominated "end-to-end smokers" his experience has been that the "taper end" is the larger. Physicians should do all in their power to prevent the use of tobacco, especially by young persons, girls and women. Tobacco is injurious, especially to those suffering from gastric disturbances, cardiac abnormalities, anemia, and convalescents from acute diseases. Athletes should never use tobacco. The com-

bination of tobacco and alcohol is to be especially denounced, as one accentuates the evil effects of the other. Smokers would decrease the dangers of tobacco use if they would use pipes with long stems and keep them clean, avoid notoriously strong tobacco and not inhale the smoke. Cigars should not be smoked too close to the end nor held too long in the mouth. The "dry smoke" is to be avoided. Many writers advise that smoking, if indulged in, be only after meals, as this decreases the quantity of tobacco smoked and any irritating saliva which is swallowed comes into less intimate contact with the mucous membrane of the stomach. Smokers are warned to keep their cigars dry and to take them out of the mouth between whiffs. Thomas has recently patented his method of preventing tobacco poisoning; it is based on the fact that certain iron salts hold in combination bases of tobacco smoke. Cotton impregnated with ferric chloride is an efficient agent for this purpose; it holds back 77.78 per cent. of nicotine and its bases; 86.11 per cent. of ammonia. A tampon of cotton dipped in ferric chloride and applied to the tip end of the cigar will thus afford efficient protection against tobacco poisoning. It is even claimed that it improves the flavor of a cheap cigar, making it more like that of genuine Havana tobacco, removing much of the nicotine and rank-smelling chemicals that are found in cheap tobacco.

The hydrotherapeutic treatment of chronic tobacco poisoning may be satisfactorily carried out at home by the institution of the full hot bath at a temperature of 100° to 104° F. for ten minutes, followed by a rapid cold sponge and vigorous friction with a crash towel. Commence the cold sponge at 80° F. and drop five degrees each bath, until 60° is reached. This will establish reaction. In the homes that possess a shower bath, the hot full bath may be followed by it at 60° F., supplemented with vigorous friction. In the institutional management of these cases our aim is to use sweating procedures, such as the electric light bath, superheated dry air body apparatus, hot air or vapor bath, followed by tonic measures. The author has decided preferences for the following method of treatment: Electric light bath until moderate perspiration is noticed, followed by the full warm bath at 100° F. for five minutes; dry thoroughly thereafter. One or two of such preliminary treatments is usually sufficient, and may be followed by the use of the electric light bath until free perspiration ensues, then the horizontal rain bath at 100° to 104° F. for one and one-half minutes, pressure twenty-five pounds, reduced to 80° F. for one-fourth minute. Reduce the temperature of the cold water two degrees daily until 60° F. is reached, at the end of which time, if the patient is fairly robust or reacts well, we may add to the above treatment the jet douche to the spine and posterior aspect of the lower limbs at a temperature of 60° F., pressure twenty-five pounds, for five to ten seconds. It is astounding how rapidly and satisfactorily

patients respond to this treatment. It will be noticed that the skin clears, the eye brightens, the cardiac action improves, digestion betters and elimination increases. I have noted the fact that after the use of the electric light bath the odor of tobacco is plainly detected when the bath door is opened.

Craving for tobacco can oftentimes be overcome by the free use of soda water, fruit juices, chewing gum, sucking acid drops, and drinking hot milk at bedtime.

There is no question but what the forbidding of smoking by minors and its legal enforcement would result in a decrease in smoking and do away with many of its evil effects in after years.

Coffee.

Coffee is the seeds of the *Coffea Arabica*, a good sized shrub or small tree, with spreading and horizontal branches, dark green, glabrous and nearly evergreen leaves. The white flowers grow in close clusters; further down are the green leaves and then the red fruits, the whole being highly ornamental. The fruit is oblong, round and purplish, enclosing two seeds about 2 cm. or one-half to three-fourths of an inch in length. This shrub is a native of tropical Africa, though it is cultivated in most of the warm places of the earth, especially Java and Brazil. The favorite brands are those of Mocha and Java, the latter being one of the most delicate and the former one of the richest flavors of the different coffees. Ageing the green berry before roasting improves it. Coffee is raised in orchards, two crops being usually produced each year. The most interesting ingredient is caffeine; besides this there is dextrin, a large amount of albuminoid matter and a volatile oil. Roasting changes the character of coffee, dissipating some of its caffeine, most of its water, and forming fragrant decomposition products, the sugar and dextrin being changed to caramel. Pure ground and roasted coffee is partaken of in the form of a decoction and an infusion. In Arabia a decoction of the green berry is drunk, but the generality of peoples roast the bean, grind it and then either put it into boiling water or bring the water containing the grounds to a boil, straining same, after which it is drunk. Soft water should always be used. Coffee in moderate quantities is a refreshing, stimulating, enlivening and restorative beverage, without apparent reactionary depression, though it is more heating and heavier than tea to the stomach. Coffee possesses some antiseptic properties. In small doses it quickens the action of the heart, raises arterial tension, increases the quantity of blood in the brain, stimulates cerebral functions, increases respiration and the secretion of urine. Large doses depress the heart and circulation, lower the blood pressure and weaken the circulation. "Coffee is excreted unchanged in the bile and urine and is a reliable hydragogue diuretic,

acting by stimulation of the secreting apparatus in the kidney as well as by generally raising the arterial tension."[1]

The use of coffee is well-nigh universal, and in a great many instances we may say that, unfortunately, its use is excessive. Many persons are sensitive to its action; in these it produces nervousness, wakefulness, palpitation, weak action of the heart, dyspeptic disturbances, and in some cases confusion of ideas. Where persisted in it may interfere with the vision. Excessive coffee users are observed to suffer from tremor, weakness of the lower limbs, a sense of falling, headache, frequently very severe, mental agitation and marked depression. The color of the skin is dark and "bilious," they are generally haggard, there is emaciation, and the features look pinched. The appetite falls off even to the extent of anorexia; there is nausea, hot dry mouth, much thirst, feverishness and coated tongue. There are usually symptoms of acute catarrh and chronic constipation. Cardiac palpitation, intermittence and weak action of the heart are very common.

The treatment must commence with immediate cessation of coffee drinking, and this in itself goes quite a distance in bringing about recovery. Patients should be instructed to drink large quantities of effervescent and carbonated waters and be at once placed upon eliminative and tonic hydrotherapy, which should bring about complete restoration in a very short time, provided no weakness or other serious trouble exists. Guided by the condition of the individual, we would commence with the electric light bath or the hot air bath until free perspiration takes place. If the patient is weak this should be followed by the application of the cold sponge at 80° to 60° F., rapidly performed, with subsequent vigorous friction with a crash towel, patients resting for an hour after the bath. A treatment or two of this character prepares the individual for the next step, or, where they are vigorous, treatment may be commenced with the following: Electric light bath until free perspiration; horizontal rain bath at a temperature of 104° to 106° F. for one and one-half to two minutes, reduced to 80° F. for one-fourth minute, pressure twenty pounds; reduce the temperature two to three degrees daily to 60° F. and increase the pressure one pound daily until thirty pounds is registered. By this time the patient should have so far progressed in reactive capacity, or if strong and vigorous the following may be used early in the treatment: Electric light bath to the point of free perspiration; horizontal rain bath at 104° to 105° F., for one minute, reduced to 60° F. for one-fourth minute, pressure thirty pounds, followed by the jet douche at 60° F., same pressure, to the spine and posterior aspect of the lower limbs; finish the treatment with a gentle fan douche to the chest and

1. Brunton, T. Lauder: "Disorders of Assimilation, Digestion," etc., 1901; Collie, p. 178.

abdomen. This is a powerful treatment and is to be administered in selected cases only.

Where *digestive disturbances* are present the general treatment above outlined will usually be sufficient, but should they become troublesome in spite of the treatment we may apply Neptune's girdle at a temperature of 60° F., worn during the night.

Insomnia and nervous manifestations require nothing more than general treatment; if they persist after two weeks' careful management of the case they must then be treated along the lines laid down in other sections of this work.

Tea.

Tea is the prepared and dried leaves of *Thea Sinensis;* is a shrub two to five feet in height, the leaves of which are evergreen, thick, leathery, smooth and lanceolate. Tea is a native of Asia, but is now cultivated in many places of the world, especially in China, Japan and India. Our earliest knowledge of tea comes from the Chinese. It is planted and when two or three years old the leaves are plucked, and if the tea is to be green are at once dried over a hot stove. Black tea leaves are placed in little heaps, allowed to wilt and ferment and dried as above. The shape of tea is attained by compressing and rolling the leaves in the hand or upon a table until they are crumpled into the little rolls or wads, of which the commercial article consists. Tea contains thein from ½ to 3 per cent. and tannin up to 14 per cent.

Very close attention should be paid to the mode of preparation in order that the infusion contain as little tannin as possible. It should be prepared by pouring boiling water in suitable quantities upon the tea, allowing it to stand for five to ten minutes and then decanted. Tea is less stimulating and more astringent than coffee. When drunk in very moderate quantities by those persons with whom it does not disagree, tea is a cheerful, reviving, exhilarating restorative. A part of hot tea's reviving influence is due to the warmth, though it will be found that cold tea is reviving and restorative when drunk on the march or during a day's shooting. Arctic explorers prefer tea as a beverage, and it is claimed that tea is the most useful, grateful and recuperative of all the beverages when properly prepared and judiciously drunk. The physiological action of tea is similar to that of coffee, and need not be here repeated. The astringent contained in tea interferes seriously with the digestion, bringing about acid dyspepsia accompanied by flatulence, heartburn, nausea, anorexia, gastralgia and abdominal pain. Constipation nearly always follows in its wake.

Upon the *nervous system* it produces mental depression, palpitation, nervous irritability, insomnia, tremor, cephalgia, anxiety or dread, and sometimes depression almost amounting to melancholia.

Upon the *heart and circulation* it may produce palpitation, inter-

mittence and weakness. Many patients who are addicted to the excessive use of tea are subject to attacks of horrible "night mare." These individuals are usually markedly anemic, tend to emaciation, suffer from physical depression, with sallowness and inactive skin. All teas, according to Brunton,* are equally injurious.

The treatment of this habit and its pathological manifestations is similar to and identical with that of coffee, which has been considered in the preceding section.

In the summing up of the action of tea and coffee, we may briefly say that when properly prepared, taken in moderation by those who are not peculiarly sensitive, their action is that of useful and agreeable beverages. When taken in too great quantities they are apt to produce nervous, digestive, circulatory and functional disturbances of various kinds, oftentimes serious in character. In such instances they should be discontinued and their use never resumed. Tea and coffee drinking are habits that can be more easily given up than any other addiction. Where patients desire substitutes, some of the cereal imitations can be given.

* Brunton, T. Lauder: "Disorders of Assimilation: Digestion," etc., 1901; Tea, p. 371.

CHAPTER XXI.

ALCOHOLISM.

Acute Alcoholic Intoxication (Drunkenness); Acute Alcoholic Mania (Mania a Potu); Acute Alcoholic Delirium (Delirium Tremens); Chronic Alcoholism; Chronic Drunkenness and Inebriety.

It has been said that if all the pain, sorrow and degradation in the world were carefully investigated, one-third would be found to have been caused by, flow from or associated with alcoholism. For many decades the question was propounded—

"Can sorrow from the goblet flow,
Or pain from beauty's eyes?"

And ever since the uninitiated have been trying to make the intelligent and thoughtful physicians and scientists believe that alcohol has not produced all the mischief with which it is credited. There is no form of poison which is so widely spread among the people, that is so rapidly increasing at the present time, as the peculiar phenomena, toxic in origin, exhibited by those who are addicted to the various preparations of alcohol. From a very extended experience the author believes that physicians, as a rule, not only do not comprehend or appreciate the extent of alcoholism, nor do they understand its many effects. It may be stated without peradventure of a doubt that alcohol is *the most powerful* of all poisons which disturb the mental function, produce physical degeneration, destroy brain structure, and increase moral obliquity. Its action is not limited to the individual, but its influence percolates to the second and third generations, producing congenitally defective children, the subjects of morbid craves for opiates or stimulants, or handicapped by some peculiar nerve affliction, or with a strong tendency to tuberculosis or mental troubles. Dana has said that "if alcoholism were entirely cut out, 10 per cent of all mental maladies would be removed at one fell swoop," and the author is rather inclined to believe that this applies with considerable pertinency to many other forms of disease. Its influence in the production of nervous diseases is baneful, direct and potent. It may be stated that it is more often a predisposing factor in heredity than it is given credit for, and upon the individual its effects are mild or severe in proportion to the amount that is ingested.

By the term alcoholism is meant those various pathological changes,

processes and symptoms attendant upon or caused by its intemperate consumption, temporary or long continued. *Inebriety* is an entirely different condition, being the craze or craving of the nervous system for stimulation. It has improperly been termed "dipsomania." It should be kept clearly in mind this difference between alcoholism and inebriety—the alcoholic may become an inebriate or insane, but the true inebriate is already mentally unbalanced before he commences to drink. Inebriety may therefore be considered a pathological state or condition of the neurons of the brain that impels the subject to drink—"driven to drink." There is an impression abroad in the medical profession that the primary changes brought about by alcohol are purely functional in character, but it should be borne in mind that the constant repetition of functional disorder may create organic disease. This is doubly true in alcohol, which by *repetition* and *direct action* creates structural changes.

Alcohol of the Pharmacopeias is one of a series of hydro-carbon compounds, all of which have as their basis a radical called ethyl, whose chemical composition is expressed by the formula C_2H_5. It is known in the British Pharmacopeia as rectified spirit or rectified spirits of wine, from its being obtained by distillation, with subsequent rectification or purification, from a mash of potatoes, grain or wine. Alcohol is usually drunk in different diluted forms known as beverages, which are grouped according to the percentages of alcohol they contain. The physiologic action of alcoholic beverages is that of a combination of effects, for they contain sugar, dextrin, salts, ether, amylic, butylic, propylic, ethylic and methylic alcohols. Sugar and dextrins may be considered as available as food, the ethers and salts may increase digestion, but the balance are dangerous and may at any time become toxic. All kinds of alcohol are poisonous, though the heavier spirits (amylic and butyric) are more poisonous than the lighter ones (ethylic and methylic). It is equally true that spirits are more toxic than equal quantities of wines and beers, owing to the greater concentration and quantity of alcohol in the former.

The amount of alcohol that can be consumed by the tissues varies according to the individual, but it may be roughly estimated at one ounce of absolute alcohol for a healthy individual in twenty-four hours, for women one-third less. Bartholow claims that all above this amount is an excess and dangerous. In amounts of two ounces of whisky or brandy many authorities consider it to act as a "food(?)", as it is used up in the economy, producing heat and energy; but it should be borne in mind that this is frequently produced at the expense of healthy cellular activity, and that even if it is considered in the light of a "food," its cost from this point of view has been calculated to be eight times that of bread. Young and middle-aged people are much better off without alcohol; elderly people can

consume a small amount at times with benefit. The food value of alcohol has been argued *pro* and *con*, and in this connection it may be stated that the experiments of Vogt show that while the capacity for physical work is increased about one-third after the ingestion of alcohol, in ten minutes this increase has almost entirely disappeared, and in addition the one ounce of alcohol ingested greatly reduced the perceptive capacity, calculation and the ability to reckon accurately. Gluck has pointed out that when alcohol is added to fatigue products of muscles, depressing effects become very marked. Rest after taking alcohol prevents any noticeable diminution in strength, but if action demands the utilization of strength, fatigue rapidly ensues.

Indulgence in alcohol is marked by various *kinds of drinking*, but is divided by Kerr[1] into those known as "convivial" drinking—that is to say, drinking associated with conditions of relative luxury, and which often leads to drunkenness but does not tend very much to chronic alcoholism; "industrial" drinking, associated with conditions of relative misery and bad industrial circumstances, which leads less frequently to drunkenness, but tends rather to chronic and constant intoxication. These forms of drinking may be again subdivided into private and public, the latter being largely confined to the middle and lower classes, though it is not entirely so limited. The convivial drinker partakes of his liquor in clubs, at dinners with friends and boon companions. The secret drinker, as the name indicates, imbibes alone and away from prying eyes. This form of drinking is especially prevalent among women. Another form is that of "night drinking," the person affected performing his labors during the day and consuming the liquor when through with his work. Many of these "drink deep wassail." The occasional convivial drinker seeks companionship while tasting of the "flowing bowl," and is generally more or less noisy and uproarious when intoxicated. The confirmed chronic drinker drinks whenever opportunity presents or finances permit, while inebriates drink when the attack seizes them. The chronic drinker may so injure his brain structurally that he may become after the passage of time an inebriate, but the true inebriate is one who was born with an unbalanced brain, and who will probably transmit to his children the disease from which he suffers, or some nervous handicap. The chronic alcoholic, drinking spirits, has a rather characteristic appearance, being thin, sometimes to emaciation, with a fiery or bluish countenance that readily stamps his habit upon his face. The beer drinker is usually bloated and shows a tendency to put on excessive fat. He is apt to appear stolid, indifferent and mentally inactive.

Individuals vary markedly in their sensitiveness to the action of alcohol, some noticing its action or influence even in minute quantities.

1 Kerr, Norman: Alcoholism. Vol. III, "Twentieth Century Practice of Medicine," 1895.

Constant use of such beverages begets in those addicted to their use a tolerance that is remarkable. Different men are affected in different ways, some getting drunk or being affected "in their legs," and unable to walk, in another the "tongue is loosened," and in still another a restless activity is produced. Harnack, who has closely studied the question of small or moderate doses of alcohol, says that it exercises simultaneously a stimulating action upon certain functions and a depressing action upon others, and this fact should never be lost sight of. Those who have such nervous systems as are very sensitive should not be taken as a measure of tolerance, nor should they be made the standard for a universal law for the governing of mankind.

It has often been asserted that the medical man prescribing alcohol has been a chief factor in the promotion of drunkenness. This subject has been specifically studied by Norman Kerr, who secured careful records of over three thousand cases of alcoholism, and he states that he was unable to trace initiation of the alcoholism to the medical prescription in more than one-half of 1 per cent. of cases, this being practically a negligible quantity. The author's experience corresponds with that of Kerr, and it should be noted in passing that in this respect there is a wide range of difference between alcoholism and drug addictions. In like manner another investigation of statistics and a personal experience leads to the almost certain conclusion that the use of tobacco does not predispose to the use of alcohol *per se*, but that the indulgence of alcohol and tobacco are usually associated together, especially by those who indulge in convivial drinking. So many human beings use tobacco with or without the use of alcohol that it seems to the author that little difficulty is experienced in settling the question that tobacco use does not tend to produce alcoholism.

The physiological action of alcohol is coextensive with the physiological processes of the human body, and requires study in detail rather than in generalization of action. Entering as alcohol does in a more or less diluted form, the first impression upon the mouth is to cause a feeling of warmth, followed by an increase in the flow of saliva due to the local irritation of the nerve terminations within the buccal cavity. This influence is likewise experienced by the esophagus, and on finally reaching the stomach the sensation of warmth becomes noticeably present, and where not too concentrated produces a sense of agreeable heat. Upon the mouth and gums the continued use of alcohol produces an intense redness or congestion, especially noticeable upon the fauces and gums, tending to make them the subject of so-called catarrhal inflammations. The tongue soon becomes covered with a thick heavy coating composed of the débris of epithelial cells, and this, together with its general action upon the gastro-intestinal tract, produces a peculiarly offensive, sour breath, that is

easily recognized by the initiated. This doubtless has something to do with and assists in causing the habitué to lose his appetite. The tongue has its characteristic tremor, hereafter mentioned. The buccal conditions are well known and classically described in the story of the day as of a "dark brown taste."

The first impression upon the secretion of the stomach is an increased flow of gastric juice, accompanied by a dilatation in the blood-vessels of the stomach wall and mucosa. As soon as the first shock passes away absorption begins to take place, and alcohol enters the circulation and is thereby carried to all the tissues. Until lately it has been held that small doses of alcohol produce an insignificant effect upon the pepsin and hydrochloric acid of the gastric juice, while large doses act as an irritant to the stomach walls and inhibit the secretion of gastric juice. This can no longer be maintained, for the experiments of Kellogg[2] have conclusively shown that even so much as 0.5 per cent. of alcohol will inhibit secretion and interfere with the food-dissolving and digestive power of this juice, while larger quantities not only inhibit, but destroy its value. Following the inhibition of gastric juice, it is not surprising to find the general nutrition of the patient soon impaired. Alcohol being an irritant narcotic paralysant, we would naturally expect large quantities, continued for any length of time, to cause sufficient irritation to set up an inflammation of the mucous membrane, with loss of the secreting power of the stomach, associated with an excessive secretion of thick, tenacious and adherent mucus. Its local action is somewhat lessened by being taken well diluted with water, for it is a rule that the greater the concentration the greater the irritation; but the author's observation has taught him that whether taken in diluted form or not, sooner or later, merely a question of time, the pathological changes can be easily found. It may be confidently stated that alcohol in any form is a noxious poison to the gastric mucosa, so that the old idea of certain forms of alcoholic indulgence being productive of no trouble is a delusion that is fast failing before the laboratory and physiological experiments that have demonstrated beyond the question of a doubt its true action. Where alcohol is continuously drunk these organs and tissues become alcoholically upset with increasing frequency, and it is then that we begin to get not alone functional disorders, but actual pathological changes. Even small doses of alcohol taken at meals have a deleterious influence because of their inhibitive action, and it may be here stated for those who wish to follow the plain teachings of truth and honesty that alcohol need never and should not be administered to those who suffer from so-called "indigestion or dyspepsia." After a continuous use of spirits, atrophy of the

2 Kellogg, J. H., "Physiological Action of Alcohol," Modern Medicine, November and December, 1893.

glandular cells takes place, usually following a chronic glandular gastritis. As a result of this, appetite and relish for food is soon lost. The connective tissue is greatly increased, and in some instances fatty degeneration takes place. Where much malt liquors are drunk we are apt to find (this is especially true of the German, latterly the American peoples) dilatation, the result of weakened muscular fiber. This dilatation is superimposed upon the irritation, inflammation and digestive disturbances due to the action of the alcohol itself. The intestines become subject to two influences where alcohol is continuously drunk, the first resulting from the action of the absorbed alcohol circulating in the vascular system, and the other the action of the alcohol and imperfectly digested food upon the intestinal mucosa itself. Intestinal disturbances are particularly prominent in children who use alcoholic stimulants, and upon the adult we find the same atonic state present in the intestine as is found in the stomach. The alcoholic suffers from most obstinate and chronic constipation, and this in its turn adds to the circulating blood large quantities of toxic material that aid the alcohol in producing structural changes in the body generally. Its action upon the *liver* is most pernicious, being manifold. Alcohol, absorbed by the radicals of the portal vein, is carried directly with but little modification into the hepatic structures, thickening the biliary secretion and lessening it in quantity. The terminal result of this constant bathing of the liver with an alcoholically poisoned stream is one of the various forms of interstitial hepatitis, or what is commonly known as cirrhotic or "hob-nail liver." Individuals have most peculiar capacities for resisting these active tissue changes in the liver as well as the general system, some seeming anomalies having come under my personal observation. The influence of alcohol upon the pancreas and pancreatic digestion is interference with the fat-splitting and emulsifying action of this secretion, for alcohol once brought in contact with pancreatic fluid coagulates or precipitates the juice and renders the enzymes inactive and valueless. This is usually assigned as the reason for the presence of fatty degeneration in the heart and other organs, generally encountered in autopsies, but does not altogether explain fatty degeneration; the author is constrained to believe that some of the degeneration is due to improper oxidative effects within the system.

In recent years our knowledge of the physiological action of alcohol upon the *heart and blood-vessels* has undergone a complete and radical change, since measures of precision have been introduced by means of which its effect upon these organs could be accurately estimated, and in no field does physiological action appear more deceptive. The action of alcohol upon the heart and circulation is not that of a stimulant, but a depressant. This fact can be clearly brought out by those who will undertake a series of tests with any

blood pressure instrument. Janeway[3] calls attention to the fact, and the author has repeatedly proven it to be true with the sphygmomanometer, that alcohol is not a stimulant to the heart or circulation, but, on the contrary, in an average or considerable dose, the arterial pressure falls instead of being raised, the fall ranging anywhere from fifteen to twenty millimeters. In like manner the tonometer, which measures the actual force of the heart, shows that the force of this organ is actually reduced, Cushny claiming it to be due to the weakening of both the vasoconstrictor centers and the heart itself, and further states that animal experiments have confirmed this view. It therefore stands to reason that the *apparently* large and bounding pulse is not the result of increased heart energy and vigor, but simply an indication of a relaxed and dilated state of the small vessels of the peripheral circulation. The influence of alcohol upon the blood-vessels is direct and powerful. The immediate effect is to dilate enormously, and to relax the entire arterial system, especially the medium, small-sized and capillary blood-vessels. This action is largely brought about by its action upon the vasoconstrictor nerves, acting in conjunction with the excitor nerves of the heart, lessening the resistance to the flow of blood and heart action. The dilatation is supplemented by the influence of alcohol upon the muscular fibers of the blood-vessels themselves, as it is a paralysant, thus increasing its influence upon the vasomotor centers. It must be borne in mind that it is not only necessary to have a relaxation of the peripheral blood-vessels to relieve the burden of the heart, but it is essential that with the dilatation of the vascular system the activity and energy of the heart must be increased. This is not accomplished in the case of alcohol, for this poison weakens the action of the structral centers as well as the nerve ganglia which are situated in and initiate and maintain the activity of the heart itself. Were this deleterious action of the poison upon the circulation all, it would not be so bad, but it must be recalled that the heart is aided in its propelling influence by the rhythmical action of the small arteries and capillaries which push the blood onward into the veins. The presence of alcohol circulating within the vascular system paralyzes this action coincidently with the production of dilatation. As a result there is an accumulation in and a slowed movement of the blood in the entire venous system. This slowing and accumulation of blood has a tendency to "dam" the arterial blood and gradually increase the obstruction and load that has to be pushed through the veins to the right side of the heart. This increase of pressure or tension within the veins frequently tends to produce dilatation of the right side of a heart whose cardiac muscular fiber is already weakened. That the venous system is engorged and the resistance increased is

3 Janeway, T. C.: "Clinical Study of Blood Pressure," 1904, p. 221.

a matter of common observation, the skin becoming bluish and the veins prominent. The irritation of alcohol upon the neural mechanism of the heart and blood-vessels results in its reserve power being called upon; in this way cardiac debilitation is increased. It is, then, not surprising that we find "heart failure" a common occurrence in drunkards, cardiac dilatation being so frequently present. Post-mortem observations have shown that the heart is, as a rule, fattily degenerated, and in many cases covered in whole or in part with fatty tissue. The muscular fiber is pale and flabby, the cavities dilated and containing clots. Myocarditis and endocarditis are frequently present. The blood-vessels themselves present enlargement with atheromatous degeneration, this latter being followed by a marked fibrosis and brittleness characteristic of arterial sclerosis. As a result of these changes the normal elasticity of the blood-vessels is lost, and they take on an increased rigidity that should make us careful and cautious in the administration of drugs, especially strychnine and atropin, which raise the blood pressure to such a great extent.

The *blood* is the circulating medium by which the tissues are reconstructed, waste material removed therefrom, and vital action maintained. It is interesting to note here that through phagocytosis bacterial diseases are prevented and recovery from them assured. It is by these leucocytes that we expect the body to be defended against the invading host. Sims Woodhead[4] has called attention to a most interesting fact, that, whereas animals have been rendered immune against various bacterial maladies—in other words, been vaccinated—this immunity is broken down and the animal rendered susceptible to the action of disease germs through the administration of alcohol. All observers agree that alcohol exercises a destructive and paralyzing influence upon protoplasm, and tends to cause a cessation of the activity and movements of the white blood corpuscles. This explains the slow reparative action of the tissues and the increased liability to suppuration so commonly observed in the drunkard. All scratches and cuts heal slowly and with difficulty. With the lessened activity of the white blood cells, bacterial life increases and overwhelms the organism through their pathogenic action. Upon the red blood cells alcohol has a most pernicious influence, tending to dissolve out of the cell the loosely retained and combined hemoglobin, as a result of which the blood cells shrink and possess greatly diminished oxidative capacity. The failure of the red cell to carry into the general system the necessary oxygen for the proper processes of metabolism results in a failure of oxygenation and the retention within the system and blood of carbon dioxide. This is but one of the many influences of alcohol by which the entire system is affected and the nutritional balance disturbed, but it does not stop here, for albuminous

4 Woodhead, Sims: *Journal of Inebriety*, Autumn, 1907

elements carried within the blood are apt to be coagulated, and the waste products that have entered the system through the defective digestion and improper hepatic action are not removed by the natural channels, as a net result of which we have the blood loaded with impure waste products, the retention of which renders this fluid less powerful in construction and reconstruction of sound tissue. As a natural corollary to this, the depreciated toxic and devitalized blood fails to remove from the tissues themselves the accumulated waste material, the result of tissue action. This arraignment of the action of alcohol upon such a vital and necessary tissue as the blood should of itself be sufficient to impress upon the medical man the necessity of its avoidance.

The *physiological action of alcohol upon the muscular system* is now pretty well established, and it may be briefly stated that muscular strength is actually diminished under the influence of even moderate doses of alcohol, facts that have been demonstrated by Kellogg and Furer.[1] The advocates of alcohol have frequently pointed out that alcohol acts as a tonic and stimulant to those fatigued, citing the fact that when a person is fatigued and a drink of alcohol is given, relief from the fatigue is experienced, and for that reason it is beneficial. There is no more deceptive belief held than this. As an actual fact, the person is not relieved by the action of alcohol upon the muscular system because he is stimulated or thereby rested, or because his muscles have become reinforced through the tonic influence of alcohol, but simply because he cannot feel the sense of fatigue. In other words, the nerves governing the sense of fatigue have become benumbed and so paralyzed that the individual is unaware of and does not appreciate the fact that he is fatigued and weakened. Subjective feeling is a most uncertain and unscientific method upon which to base assertions, but it can be truly and accurately gauged where the dynamometer is used, this showing accurately the decreased muscular capacity. Prof. Parkes, experimenting in the last Ashantee war, and the experiences of Arctic explorers, hunters, and many carefully conducted experiments upon laborers and athletes, show that their muscular activity is weakened by the use of alcohol. It is interesting to note that when the Great Western Railway decided to change the gauge of its rails along the whole line, it substituted oatmeal gruel for alcohol, because the work required accuracy and had to be done with great rapidity and with unusual energy. The author has heard Prof. Nansen personally state that Arctic explorers were always weakened by the use of alcohol, and that it was banished from his expeditions. That alcohol affects the muscles detrimentally is shown plainly in the chronic drinker. If the tongue is protruded it will be noticed, even in the earlier stages of alcoholism, that it trembles, and that as the malady

[1] "Rational Hydrotherapy," 1906.

progresses this increases, and added to it is a general tremor or shaking of the muscles which at times may simulate shaking palsy. In addition, we may find fibrillary twitchings that may be and are suggestive of paresis. Many drunkards are afflicted with a certain muscular irritability and restlessness, which is most often manifested in the early morning on awakening, probably due to the fact that they have had no alcohol during the night to act as a sedative and narcotic, and are experiencing the toxic effects of its absence. This trembling is oftentimes most noticeable in the legs, though after a time it involves all the skeletal muscles.

The *physiological action of alcohol upon the kidneys and urine* is a noticeable feature in nearly every case. It is the function of the kidneys to largely maintain the purity of the blood by removing therefrom the toxic materials that are taken into the circulating stream from the viscera and tissues. This function is so important that where renal activity is interfered with for even a short time, say a few hours, sufficient toxic material may be accumulated to render the person unconscious and produce death. The primary action of alcohol within the kidney, and brought to it by the circulating blood, is that of congestion followed by irritation. If we examine the urine at this time we are apt to find the quantity augmented, a faint trace of albumin; urea, phosphates, chlorides and sulphates diminished. Indican is frequently present together with other evidences of intestinal putrefactive changes. Microscopically, we find uric acid and oxalate of calcium crystals much in excess of that found in health; some epithelium, a few casts and cylindroids, a result either of the changed metabolism of the tissues or an alteration by alcohol of the relative solubility of the urine salts. The casts and cylindroids result from irritation. Alcohol is cumulative in its action, and it is not long before the drunkard is apt to have nephritis, the natural sequence of the irritation of the kidney tissue, with the result that the function of these important organs is interfered with in a marked degree and permanently crippled. Where the injury is continued the kidney begins to undergo those changes that are characterized as cirrhotic. We get the small, hard, shrunken kidney. The interstitial tissue is increased and the parenchyma compressed and destroyed. The urine now presents characteristic features—large in quantity, pale in color, low specific gravity, diminished solids, trace of albumin, microscopically a few epithelial cells and an occasional hyaline cast.

The *physiological action of alcohol upon the lungs* is to lower their activity and interfere with their function. Through its influence upon innervation and by weakening the muscular structures of the chest walls, inspiration is lessened in its amplitude, and as a result less air enters the chest. The normal diffusion of gases that

should take place in these organs is thereby lessened, and the failure to thoroughly and completely oxygenate the blood results in a failure of these organs to remove from the blood itself the contained carbon dioxide, increasing the presence of waste material and gases in the system, reinforcing the failure of the kidney to do its work. Chronic alcoholism tends to produce a low-grade, chronic congestive state of the mucous membrane of the bronchioles and air cells, by which their vitality is lowered and the individual rendered much more liable to an infection by any of the many forms of micro-organisms. Those who have given the subject considerable attention find it an experience too common to remark upon that the chronic alcoholic is a predisposed subject for the manifestations of acute and chronic tuberculosis, and that if we wish to offer an efficient and powerful prophylactic measure for the prevention of consumption it would be the repression of alcoholism. It is not an unusual thing for pulmonary tuberculosis be one of the complications of the terminal stage of chronic alcoholism.

The *physiological action of alcohol upon the temperature* is most interesting. The average unscientific mind, and especially laymen, insist that the temperature of the body and its warmth is actually increased. As has been said before, alcohol is a most deceptive poison when judged by "feelings." In spite of the simplicity of a test to guard against such a fallacy as believing that alcohol raises the temperature and increases the warmth of the body, physicians seem to be averse to testing this fact with their clinical thermometers. It may be stated that a characteristic effect of alcohol is its lowering of the temperature of the human body and thereby depriving it of heat, one of the most necessary essentials to the maintenance of health and vitality. Owing to its action upon the peripheral blood-vessels, a marked dilatation takes place, with an increased quantity of blood circulating therein, with increasing heat radiation. Upon heat formation alcohol lessens its amount by direct toxic action of the poison on the thermogenetic centers, incidentally by lessening muscular activity and decreasing metabolism and oxygenation. The main loss, however, is by radiation, assisted by diminished oxidation. The thermometer will show a nearly constant subnormal temperature. This is another reason why deer-stalkers, Canadian hunters, Arctic explorers and others have given up its use.

The *physiological action of alcohol upon metabolism* has already been touched upon, though this phase of alcoholism has not been investigated as it should be. The normal and active oxidation that takes place in healthy tissues is interfered with by the presence of alcohol, preventing as it does tissue change, removal of waste products and reparation. The failure of the blood to absorb the needed amount of oxygen prevents the final intercellular processes of metabolism

taking place in the tissues, and waste accumulates within the system. The failure of the kidney to remove from the blood the toxic material absorbed from the gastro-intestinal tract and from the toxic tissues, adds to the already poisonous condition, and further prevents the removal of the results of tissue oxidation. The processes of metabolism are so intricate, complex and varied that it may truly be stated that each and every organ in the body influences its action, and it is not surprising that alcohol, which affects directly and indirectly every tissue and function of the body, should seriously derange these changes. It must be borne in mind, and may be reiterated, that, aside from all the influences here referred to, it has its own destructive and paralyzing action. Sims Woodhead[6] has clearly demonstrated that alcohol produces changes in metabolism closely allied to those produced by the toxins of various bacterial poisons. He states that oxidation, which is the essential element in all metabolism, is most seriously interfered with by this poison. This essential feature has been elaborated by Sajous.[7]

The physiological action of alcohol upon the skin and mucous membranes is easily observed. The first effect is that of a rather diffuse redness, most noticeable in the face, due, as we have seen, to a dilatation of the blood-vessels, and accompanied by a moderate degree of perspiration. Where this is repeated the vasomotor paresis becomes constant, and we get the facies generally associated with alcoholism, consisting of the watery, blood-shot eyes, yellowish hue of the skin, bloated appearance of the face, and an enlargement of the veins upon the nose and cheeks. So common and prominent is the nasal feature that it has been dubbed by the laity as the "bottle nose." After long and continuous use the skin assumes a yellowish, grayish tinge, is usually bathed in a cold, clammy, disagreeable sweat, especially unpleasant to the touch. By some alcohol is used to cover sores and wounds in primitive conditions and practice. Its action is to promptly coagulate the albumin of the tissues, forming a thin, protective, air-excluding layer which promotes healing. Alcohol in the shape of an "alcohol rub" produces a sense of coolness, due to its rapid evaporation, and where this is prevented and alcohol is kept in prolonged contact with the skin it excites a sense of heat and superficial inflammation. Where confined it penetrates the tissues, but when "rubbed in" its influence is superficial. Its action upon the mucous membranes is similar but more intense. On account of the features here enumerated alcohol has been used as a domestic gargle in various inflammations of the mouth and throat, and the author can state from his own experience that it seems to possess excellent value where the mucous membrane is denuded. In the buccal and pharyn-

6 Ibidem.
7 Sajous: "General Semeiology," 1901.

geal inflammation and sores that accompany syphilitic affections of the mouth and throat, when used as a gargle, through its power to coagulate albumin, has brought about healing when other better known remedies have failed.

The physiological action of alcohol upon the nervous system is, in the opinion of the author, the most pernicious of all its baneful effects. Poets have pictured, moralists described, pathologists determined and neurologists observed its peculiar influence. Alcoholism is one of the most frequent causes of mono- and multiple neuritis. No neurologist of any experience but what knows the many and varied forms, simple and complex, from a neuritis of a single unimportant nerve to Korsakoff's symptom-complex, more frequently owe their origin to liquor than any other cause. Alcohol, as has heretofore been shown, has a most benumbing influence upon the peripheral nerves, actually lessening sensation in all of its forms, this being especially noticeable along the lines of touch, pain and the temperature sense. Where this action is continued the peripheral nerves, following the law applicable to other tissues, become inflamed, and as a result partial or complete degeneration may take place. Its action upon the vasomotor nerves has already been noted, the paralysis of which causes dilatation of the blood-vessels located in the cutaneous area. The sense of touch and pain is so blunted by the presence of alcoholically saturated tissues that normal perception is not only often misconstrued, but even not perceived. This has often been utilized for minor surgical work. The blunting of the nerves of temperature is such that while the individual has the sensation of warmth in the skin *actual thermometric tests* show the temperature to be subnormal. Any one who will undertake to carry out these simple experiments can demonstrate to his satisfaction the truth of the assertions made here. It is a common statement that drunkards fall and do not hurt themselves, but this may reasonably be called in question when one stops to consider the fact that they may be hurt, but because of the anesthesia present they do not notice the injury. Probably this belief has been enhanced by the fact that in the falls of drunkards fewer bones are broken, this being easily accounted for by the relaxed and unresisting muscular system. Many of the so-called functional disorders associated with the peripheral nerves are in reality, in alcoholics, forms of subacute or chronic inflammation, and are usually revealed by careful and thorough testing. The neuritides of alcoholism are less frequently recovered from than the same class of diseases that originate from other causes. This is probably to be explained through the lessened vitality and vitiated state of the system. The knee-jerks and reflexes are exaggerated. Upon the *central nervous system* alcohol exhibits its profoundest influence. The brain and spinal cord are, of all the tissues of the human body, the most delicate and highly organized,

and are of all the tissues the most promptly responsive to, and most constantly affected by, alcohol circulating in the blood. Upon these tissues its action is subtle and far-reaching, sparing no function or attribute of the mind, its action being intensified through the special affinity that alcohol has for nerve elements. Its action is directly toxic and involves all mentalization. In addition to this, it superadds the burden of a toxic blood stream loaded with retained waste products of urea, ammonia and carbon dioxide, re-enforcing its own action. It is interesting to note that alcohol antedates senility by from five to twenty years, and this takes place even in those who have no alcoholic heredity. People of unstable nervous organizations are peculiarly susceptible to its influence, and are apt to acquire the habit readily. It would probably pass unchallenged to say that alcohol has been the most prolific inciter of breaches of human and divine law, ranging from the smallest offense to the greatest crimes in the calendar, both against person and property. The beneficent result of modern scientific research has placed beyond the question of a doubt the fact that a large proportion of the most confirmed alcoholics and inebriates are diseased, and that they are so thoroughly diseased that they may even have an utter loathing against intoxicants, and yet use alcohol in spite of their repeated and desperate struggles to avoid drink. One would feel gratified if they could believe that intelligent laymen and scientists were united in realizing that the question of alcoholism is not one of mere morality, vice or crime, to be punished by jail or penitentiary sentence, by excommunication or treatment as though they were wantons, but deserves careful consideration, intelligent thought, medical supervision and confinement. The nervous and sanguine individual is much more susceptible to the influence of alcohol than his phlegmatic brother.

Immediately upon taking a drink of liquor there is a sense of well-being, comfort and restfulness, alcohol resembling thus in its action other narcotics. Those of us who have seen many cases of the different forms of inebriation will at once draw the analogy between this action of alcohol and the "hypo" of the morphinist. This period of well-being is due to a paralysis of the vasomotor nerves of the blood-vessels of the meninges, which become dilated with an increased quantity of blood; exhilaration and elation ensue. Venous stasis follows; the blood-vessels cannot contract and fresh aerated blood does not reach the brain. This period is succeeded by one of depression, with a sense of weariness that calls for another drink. To the average layman and non-medical person an intoxicated individual occupies the whole gamut of emotions from pity and sorrow to humor and laughter, for he appears to be simply a man who has gone beyond his own control and more or less bereft of reason and judgment, but the intelligent scientist and thinker looks deeper than the surface and

realizes the fact that he is under the pathologic influence of an anesthetic that is destroying his body and soul. The confirmed alcoholic and the inebriate may have a knowledge of their present and past state, and may be alive to each downward step as they plunge into the abyss, and may even form the strongest resolutions to drink no more, yet with all this, and in spite of the most desperate attempts to abstain, may be utterly powerless to refrain from intoxication. This should be borne in mind, as it is the basic rock upon which State prophylaxis of alcoholism is to be built.

It may not be amiss to call attention to the tissue-crave from which these individuals suffer. By its affinity for water, alcohol is freely taken up, and, as we have shown, circulating through the body vitiates and depresses the tissues to such an extent that as soon as the anesthetic effect of the drink has disappeared the tissues cry out for a fresh supply, and until this is given the whole system is in an agony of distress, so that even though the patient may loathe the taste of liquor he cannot resist the overpowering, intense and universal tissue-crave for relief.

Alcoholics are prone to have morbid ideas and delusions, one of the most common of which is the delusion of marital infidelity. Many a wife has had to suffer for this delusion, so frequently occurring in this disease, and probably built upon the groundwork of a sexual incapacity resulting from the toxic and degenerating influence of the poison. Delusions of persecution are common, and often occur because of disorders of the special senses—noises in the ears, *murcæ volitantes*, the appearance of figures, lines or flying forms that weirdly float before the eyes. These delusions and hallucinations cause the individual to harbor the idea that some one is trying to injure him, or that he is hunted by a ghost or other intangible "things." Alcoholics are morbidly jealous, especially of their marital partner, and of others against whom they have taken some unfounded dislike. I have frequently found them to suffer from the morbid dread of impending disaster, a sword of Damocles, intangible yet ever present, from which they cannot escape.

Motor disturbances are shown in the fine tremor, non-intention, which is nearly always present. They lose control of the muscles in the execution of delicate movements. The gait, movement and speech are inco-ordinate and ataxic. Their ability to measure the actual strength of their muscular acts is lost, and at times they may strike without the intention of doing any harm, and yet hit so hard as to actually kill.

Insomnia is always present, sleep being disturbed, and from which they wake unrefreshed and weary. In the earlier stages alcohol causes heavy and profound dreamless sleep, but gradually and insensibly it becomes less sound, is accompanied by harassing and horrible

dreams, from which the sufferer awakens terrified. Insomnia is the terror of the chronic drunkard, especially those who are cultivated, cultured neurotics, and who demand sleep at the cost of powerful influences.

As a cause of *mental disease* alcohol is most prolific; it is interesting to note that just in proportion to its use insanity increases. Kerr[1] believes that 40 to 50 per cent. of all the crime and bad conduct may be ascribed to alcohol; the figures seem large, but in the author's opinion are not overestimated.

Alcohol has always been, and is at the present time, a most important, if not *the most* important factor in crime.

The physiological action of alcohol upon the sexual system is one of the most important and interesting of all the actions of spirits upon the organism. A careful analysis of conditions will show that its first influence is purely mental. The ethics and relationship between the sexes is like the bloom upon the peach—delicate, beautiful, is maintained through the sum total of the action of all those influences for good that go to make up honor, probity, truth, conscience and respect. The influence of alcohol is to first lower or even obliterate this standard in the individual. The direct action of the poison upon the sexual system and its correlated nerve centers is to stimulate and increase desire as control is lessened. It will thus be seen that the individual under the influence of alcohol has lost that feature of his mentality that would tend to keep him in the straight and narrow path, while at the same time he has over-stimulated sexuality, the repression of which is absolutely necessary for his proper conduct. This statement made in masculine terminology is equally applicable in terms feminine, for it is a fact notorious to "rounders" and fast men of the world that the proverbial bird and cold bottle are the means by which sexual gratification may be obtained even though the individual, male or female, would under ordinary circumstances have not so indulged. Alcohol has been the means of the downfall of many bright and promising young men; the ruin of many young women whose lives would otherwise have been all that they should have been and as "pure as the driven snow." Moralizing does not belong to text-book writing, but certainly parents should realize the dangers to which their sons and daughters are exposed when they gaily and thoughtlessly permit youthful individuals whose blood current is naturally strong and hearty to indulge in a beverage whose insidious and subtle power is to rob them of what goes to make some of the most beautiful attributes of humanity—modesty and purity. The unfortunate trend of education and early contact between the sexes in this country has prepared mere boys and girls with a knowledge that was unknown to progenitors half a decade later, and this, together with the increased

[1] Kerr.

and recognized consumption of alcohol by women, is now accepted as one of the reasons for the great increase in open and clandestine prostitution. It is certainly a good rule and an excellent law that young people should be governed by all those influences that go to increase and develop the resistive power of the will, and should avoid all influences, especially alcohol, which will have a tendency to lessen or reduce this most necessary attribute of the brain.

Between single and married males there is little difference in the amount of drinking, but in women the difference between the married, widowed or divorced and the spinster is in the proportion of one to four or six. This difference in the consumption of liquor by those who have entered the marital relation is to be largely accounted for in the increased worries and care, trials and tribulations that come to the family as a whole. Those who study the internal mechanism of the home know that even in the "best regulated families" the essential human element is never absent, and that unavoidable friction, worry, cares between husband and wife, the fretting of children, their supervision and attention, the never-ending and constant burden, all tend to lead the woman to seek in the anesthetic influence of alcohol some escape from the incubus and millstone that is about her neck. "Woman's work is never done," saith the old saying, and it is based upon this statement that the genesis of alcoholism is oftentimes founded. A child conceived during the alcoholic period may not only have a strong tendency to but may actually acquire drunkenness at an early age. Where the mother is the drinker her influence is more powerful than the father's, but it becomes greatly accentuated when both use the poison. Drunkards beget neuropaths, and these neurotics may not drink or have a drink craze themselves, may in their turn beget progeny with an unstable neural organization and a strong tendency to the use of alcohol. It will thus be seen that in its effects it may skip a generation and return in the next. These neurotics and degenerates have their vital and resistive force much lessened, so that they show the effects of alcohol more quickly than does the child of normal parentage, and my own observations have been that such progeny are much more apt to have delirium tremens than the ordinary drinker.

Alcohol does not stop at changing the function of the nervous system, but eventuates in organic disease. These changes gradually take place, and in the terminal stages we find that the brain and nervous system are seriously affected. The membranes are thickened and altered; the blood-vessels are greatly thickened, the blood supply is lessened, the brain anemic and poorly nourished. The brain itself is shrunken, with flattened, narrow convolutions. There is an effusion of serous fluid in the subarachnoid and ventricular spaces. A general wasting of the neuron bodies and fibers, followed by a dense growth

of nutty connective tissue, takes place, which intrudes presses upon and alters their form, impoverishes their nutritional supply and lessens their functional capacity. It is not surprising, therefore, with the degeneration of the nerve and the subsequent growth of fibrous tissue, that mental symptoms may be traceable to the degeneration of brain tissue itself as a result of alcoholic poisoning. It is at first a functional, later an organic, physical destruction and degradation of both meningeal and cerebral tissues.

As a predisposing cause of other diseases, alcohol is most prolific. It weakens the power of the organism, lowering its opsonic index so as to lessen resistance to the various infectious diseases, death resulting oftentimes in very short periods from recoverable diseases, this being especially true of pneumonia. The alcoholic's tissues are much more subject to pus formation or any form of streptococcic infection, and, in fact, the alcoholic is in reality more subject to every phase and form of disease than the temperate man. The converse is true, that in no inconsiderable number of cases certain diseases predispose the individual to alcoholism, among which may be prominently mentioned syphilis, consumption, many neuroses, diabetes, sunstroke, apoplexy, and head injuries. In women nervous shocks, menstruation, especially where it is painful, the menopause, and where their life is monotonously dull, lead to the use of liquor. In this connection it may be remarked that many instances of alcoholism in men, but more particularly in women and children, are due to the *patent medicine habit*.* Patent medicines are, as a rule, a mere "shallow device" for placing within the grasp of these unfortunates an alcohol "dope" by means of which "repeaters" are made and alcoholic and narcotic habits formed. It is a business the villainy of which could not be compassed in an anathema, where every word in the English language of such a character employed, and men who sell their souls in such a business for the monetary returns should all suffer like Macbeth, with a million Banquo's ghosts in daily and nightly attendance, for "all the sweets of Arabia cannot wash the stain from off their hands."

Many of those who engage in the sale of alcohol, or who "tend bar," while they do not, as a rule, drink to excess and get drunk, are fairly good consumers of their own beverages. Drivers, cabmen and others who are more or less in the open air are apt to consume large quantities of alcohol. Its influence upon them seems to be somewhat less pernicious than those who lead an indoor life, for the fresh air and exercise seem as it were to "burn up" a large part of the alcohol drunk. Many men who are employed in callings involving responsibilities, anxiety and exhausting brain work, and even in some of the learned professions, we find frequently drifting into the use of alcohol

* See series of articles in Collier's Weekly, Ladies' Home Journal and Journal of the American Medical Association during 1907.

to overcome some of the depressing, wearing influences of their work upon the nervous system. It has been my personal experience that of all professions the ministry indulges less in alcohol than any other, and this is as it should be, owing to the fact that, by their teaching, example and moral influences, they must be against the use, by themselves and in others, of alcoholic beverages.

It is generally accepted that the two races, the Anglo-Saxon and the Russ, in the consumption of alcohol show probably the greatest proportion per population. From personal observation in America, England and upon the Continent, the author believes it to be true that the Latin nations are by far the more temperate. In Spain, Italy and France, to national habits and customs, the use of the *vin du pays*, with its minimum amount of alcohol, and the fact that "treating" is, as a rule, unknown, is to be ascribed some of the reasons for the temperate use of this poison. Savage races are prone to indulge excessively in the use of alcohol, owing to their intense and characteristic energy, the nearest approach to which is in this country the negro race. The author has had unusual opportunity of observing the growth of alcoholism and other narcotic drug habits among negroes, and can state from positive knowledge that there was at one time comparatively small consumption of spirits or whisky; that in later years beers and lighter drinks have given way to the use of the stronger beverages; that the negro race at the present time is more readily excited to drunkenness, and it may be incidentally remarked that they are much more speedily killed by its use. It is the author's belief that eventually the negro will be largely depopulated through the action of tuberculosis, liquor and syphilis, the results of which are shown with startling and shocking vividness in their effects upon the descendants of Ham. It is certainly a commentary worthy to be emulated that the Jew, by his peculiar inhibition and rational control, shows a marked freedom from the effect and action of alcohol. It is the author's belief, however, that this will gradually pass away for the reasons before assigned, their intermarriage with other races, and because of the peculiar strenuous life in which they are now being thrown.

Atmospheric and climatic conditions influence many persons in the use of liquor. A depressing, dark, cold, damp foggy climate, by its action upon the higher nervous centers and the circulation, tends to create in many individuals a desire to do away with this depression and restore the seeming balance; this they accomplish by the use of alcoholic spirits. Climate increases the consumption of spirits in those whose will-power has become weakened, and offers an excuse for an indulgence. It is probably for climatic reasons that the Anglo-Saxon and the Russian become the greatest imbibers of alcoholic beverages. American authors—and with whom I heartily agree—believe that the increased nerve tension, as well as the rapid varia-

tions in temperature, in this country, largely account for the greater intensity and rapidity of American inebriety — the entire career of an inebriate in America, from start to finish, being of much shorter duration.

The presumption would seem to be that the lower and uneducated classes would be the greater users of liquor; still, my experience thoroughly agrees with that of Kerr,[10] in that 85 to 90 per cent. of all the cases have received liberal education, translating the word liberal into a "fair amount" of education. Many of the "brightest lights," who have had advantages of university training, become subject to the craze, for we find in civilized and educated communities refined people are much more subject to alcoholic habituation than would be at first believed. In the educated and upper classes my observation also leads me to believe that the intoxication is more maddening and boisterous than in the lower classes, in which latter we may expect the more brutal and sodden examples of alcohol's deadly work.[11]

The American nation has been accused of being driven to alcohol on account of improper, defective and partly cooked food. Authors, in a vein of badinage, have stated that the skillet and frying-pan have been two of the implements by means of which Americans have achieved proficiency in the use of liquor. There is no question but what a number of persons are led to use liquor through indigestion and other ills flowing from bad and improper food, under the mistaken idea that alcohol stimulates digestion a condition, as we have already noted, that is opposed to fact.

The *immediate* exciting causes that lead to alcohol are unlimited, but the principal ones may be stated. It may start as a temporary measure and become permanent, the individual thus gradually and imperceptibly growing into the habit. Mental distress, where it originates in domestic, commercial or religious life, is a fruitful cause of consumption of this poison. There is an urgent and incessant demand for an euthanasia that can only be bought by some narcotic poison. In like manner loss of reputation and marital disparities tend to the use of that which will give oblivion in the present, but that means disgrace and death in the future. Many men—and this is especially true of physicians and lawyers—take to alcohol as a temporary means of "tiding them over" some period of special stress. Having found comfort in the benumbing influence of alcohol, they are prone to turn to it again and again, until the habit becomes fully established and they are compelled to continue its use to maintain the equilibrium. The excitation of puberty, the menopause, pregnancy and during the menstrual period; the monotonous and dull routine,

10 Ibidem.
11 Ibidem.

marital infelicity and excesses, a longing and a desire to forget all that may make life uncomfortable and unhappy, lead many women to the cup that cheers and destroys. Insomnia, pain and ill-health drive many to liquor, and in this connection the advertisements of certain "malt" whiskies as beneficial in these conditions have, to the author's certain knowledge, created not only physical havoc with women, but have made unsuspecting though moderate drinkers of not a few. It is to be regretted that all those that belong to this class are unaware of the value of tonic hydrotherapy.

The pathological anatomy has been dealt with when considering the physical action of alcohol upon the various organs and tissues, but it may be stated in general terms that the fibrous structures of the body are especially subject to stimulation and inordinate growth, this being markedly accentuated in the blood-vessels, liver, kidney and brain. This increase is so profound as to be macroscopically visible, and constitutes a structural and functional disorganization of such extent and intensity as to justify the words of Sieveking, that "there is not a degenerative bodily condition which may not result from alcohol." This is not all, however; the texture of various organs becomes riddled with fatty degeneration, their structure and function so weakened as to materially interfere with the performance of their duties.

Acute Alcoholic Intoxication.

Acute alcoholic intoxication is the most common of all the acute processes, and most frequently arises from the use of ethylic liquor. No man sits down to get drunk, but after a few drinks and the alcohol has begun to enter the circulation the vascular relaxation heretofore spoken of takes place, followed by its characteristic sense of glow and warmth, together with pleasurable ideation. He begins to become lively, merry—nay, joyous—and with an increased feeling of excitement and energy. In the highest spirits, he becomes communicative, and often confides to strangers his most private affairs, that he would never think of talking about were he really himself. Gradually the action of alcohol increases this tendency, his spirits and excitement rising higher and higher, until he becomes more demonstrative in love and argument, more emphatic in his gestures, louder and coarser in his laughter, more furious in his fun and jokes. With deeper potations he begins to develop an obstinacy that is incapable of being reasoned with, and that is not amenable to control. He gradually grows incoherent in thought and actions, his speech becomes thicker and more confused, his imagination excited, his emotions dominating him completely. Intellect, reason, will-power, thought and conscience gradually recede, fade in the background, and in many instances a modest, retiring, quiet individual becomes a boaster, a braggart and a

liar. This has been denominated "Dutch courage." About this period many drunkards become irritable and quarrelsome, the meek and lowly often violent. By this time the muscular system has become seriously affected, there is difficulty in co-ordinating arms and legs; he staggers, reels and trembles. When this is continued much further he becomes, in the language of the police station, "dead drunk"—lying upon the floor, on the pavement, even in the gutter, unconscious of his surroundings, pale of face, cold of extremities, insensible, "dead to the world," with all gone that goes to make the glory of man above the beasts, with neither sensation, perception, emotion nor mental power. The heart and circulation keep him from passing to that bourne from which no traveler has returned, and enable him to emerge from the dark stupor into which he has plunged. It is an observation that is constantly presented to the physician that the man or woman who has a paroxysm of acute intoxication for a day or two and then allows a month or several months to intervene, does really less injury to the body than those who take even small doses of alcohol daily or several times a day. The total abstinence period enables the organs and tissues, as it were, to throw off the pernicious influence of the poison, and in this way he can for years withstand his bouts or sprees. As we shall note later on, the dangerous drunkard is the moderate drinker, who "soaks" his system daily in four or five moderate doses of alcohol. Complete repair of tissue cannot take place in a few short days, nor in a few short weeks, immediately succeeding a severe drinking bout or an attack of alcoholic delirium. Every one of these attacks acts in a damaging way upon the nervous and general tissues, and in order that repair may be brought about time becomes an essential element to secure a renewal both of tissue and function.

The *pathology* of acute alcoholic poisoning depends upon the kind of drunkard—the voluntary occurring as an accident during drinking from custom, habit or fashion; the involuntary, the inebriate, drinking because of the strong morbid impulse and crave; an acute intoxication being merely an incident in his drinking career.

The *prognosis* is excellent; in private practice the writer has so far never lost a case. In general and public hospital practice, however, the prognosis is very much less favorable, owing to the fact that the parties brought in are more or less in an unfavorable general state of health, or have been picked up on the street in a state of coma after having been exposed for some time to climatic influences, especially dangerous being those of winter, and in which the condition is followed by an attack of pneumonia.

The *treatment* of acute alcoholic poisoning should be to immediately empty the stomach. If this has not been accomplished by emesis on the part of the patient, the stomach-tube is to be introduced and lavage practiced. Before the stomach-tube is removed a tumblerful

of hot water containing thirty grains of the chloride of ammonia should be passed into the stomach. The bowel is then moved by means of a high hot saline enema. The patient should now be catheterized, and it will be frequently found that the urine is loaded with albumin, urea, blood casts and epithelium, a condition which, if allowed to go on, would result in uremic coma and death. These cases must be promptly treated by catharsis, diuresis and diaphoresis. The general treatment here outlined will in the majority of instances meet the indications. It has been the author's experience that if any one element is essential to the success in treatment it is the application of heat and *keeping* the patient warm. For this purpose he is removed to the hot full bath, in which he is thoroughly rubbed by the attendant, and at the same time his head and face are sponged with cold water. A cool turban is then placed upon his head and he is allowed to remain in the bath at a temperature of 100° to 104° to 110° F., if possible, for eight to ten minutes. From this he is removed and wrapped in the full dry pack, continuing the use of the cool turban or the ice-water helmet. This treatment will stimulate and in many instances do away entirely with the depression and exhaustion found. It is a good plan to use every three hours during the first twenty-four one to two drachms of aromatic spirits of ammonia, well diluted with water. If the patient is very restless we may at the same time administer hypodermically small doses (one-thirtieth to one-twentieth grain) of apomorphia hydrochlorate. After the patient has been removed to bed external heat should be carefully applied, especially to the feet and abdomen, it being a good plan to keep hot-water bottles in the bed about him. The diet must be absolutely liquid, and consist of warm milk, milk and Vichy water, or hot milk and lime-water, and as soon as possible, if the stomach will retain same, pill of blue mass (three to seven grains) or calomel (two to five grains) administered. When there is evidence of reaction it is well to commence with the cold sponge carefully performed. When he responds to this we may proceed to the use of the full wet pack at 75° to 65° F. for twenty to thirty minutes. The success that the author has attained in the use of this method, which can be applied at any general hospital, private home, jail or infirmary, is such as to make him lean upon it with a feeling of certainty in the management of these cases. He is firmly of the opinion that the proper place for the treatment of drunkards picked up on the street by the police is not the ward of the jail, but a general hospital, properly equipped in order that the method here outlined may be applied.

The after-treatment of acute alcoholic intoxication is a matter that is somewhat difficult, as these patients are prone at the end of two or three days to desire again to take up their avocation or resume the even tenor of their way. It should be impressed upon their minds,

however, that it is essential for them to undergo a course of treatment for at least thirty days in order to do away with the evil effects of the drinking bout. This treatment should embrace a liberal dietary, with a restriction of the amount of meat eaten and the daily use of the hot-air bath or electric light bath until profuse perspiration takes place, followed by the horizontal rain bath at 100° F. for one minute, reduced to 70° F. for one-fourth minute, pressure twenty pounds. The temperature of this bath should be rapidly dropped to 65° F. and the pressure increased to thirty pounds. As soon as the patient can stand its application, which is usually at the end of about a week, the cold jet douche, pressure thirty pounds, should be used as a finishing treatment to the above, applied for five to ten seconds up and down the spine. Where access cannot be had to such an institution where hydrotherapy is used, the general hospital or private home may employ the general wet pack at 65° F. for thirty to sixty minutes, followed by the ablution or sponge at 60° F., or the half bath for three minutes at 65° F. These latter methods are in no way comparable to the use of the circular rain bath and jet douche. It is simply astounding at times to see the beneficial results that follow this treatment after the ordinary alcoholic spree. The keeping of the patient under treatment for thirty days enables the physician to exert a strong moral influence that will oftentimes obtain from him a real desire to turn from the error of his ways. This element in the treatment is unquestionably a neglected one, and should have the attention of the medical fraternity much more often in the future than it has in the past.

Acute Alcoholic Delirium; Delirium Tremens.

This is an acute alcoholic toxemia characterized by trembling, dreadful fright and great prostration. It occurs chiefly in habitual drinkers, although it occasionally attacks a drinker after a single bout. Some persons seem to be especially liable to these attacks, owing to the peculiar action of alcoholic beverages upon their nervous system, the poison probably having a selective influence. Delirium tremens is so well recognized as a positive and frequent outcome of alcoholic indulgence that it is made the subject of jokes upon the stage, and is a condition that is readily and promptly recognized by the layman.

Usually the patient who is about to have an attack of delirium tremens manifests a restlessness both day and night, is irritable, peevish and easily upset. He has generally gone for quite a while, sometimes many days, with little appetite, digestive disturbances and practically eaten no food—in fact, it may be considered a "starvation delirium." At other times the attack is more sudden in onset, and the patient is seized without premonitory warning; in fact, some cases may retire at night and awake either during the night or early morning

in a fully developed attack. Delirium is usually the first symptom, and is accompanied by a general trembling or shaking, this being such a prominent symptom as to cause former writers to make it a part of the name designating the disease. The sufferer is absolutely stricken and consumed with a deadly fear, the like of which can only be appreciated by those who have seen sufferers from this disease. He becomes a prey to the most loathsome, gigantic and terrible reptiles, which seem to crawl over and about him and sink their fangs into his body. His countenance assumes a peculiar facies of terror that is characteristic. He may believe that people are after him for the commission of some dreadful crime; at other times an indefinite, unsettled, impalpable something hangs above him like "the sword of Damocles." At other times rats, mice, rabbits, dogs, terrible monsters, "little iron men," and others seem to vie with one another in their power and capacity to hurt and injure. These hallucinations may be in almost any form, but no matter which particular individual condition may be present, the essential element is the intense *terror*, the hallucination causing the patient to make most fearful and strenuous efforts to escape from his tormentors, oftentimes clutching vainly and despairingly in his distress and hopelessness. His delirium is a busy one, full of suspicion of each and every thing, of every body. He is constantly muttering or talking to himself in an uncontrollable, incoherent and incessant manner, day and night. In fact, some cases rehearse nearly all they have done and said in their ordinary vocation for several days prior to the attack of drinking. The temperature may not rise over 100° F., at other times it is much higher than this, although it rarely goes, in my experience, over 104° F. The temperature bears a somewhat prognostic relation to the attack, for it may be stated that the lower the temperature the better the prognosis, everything else being equal. The pulse is fast, feeble, soft and easily compressed. It is usually a small pulse, and may be intermittent. In the few cases in which I have been able to test the blood pressure I have found it was low, ranging from 90 to 110 mm.[12] The tongue is tremulous, indented, and covered with a whitish coat. The tremor or trembling is usually well marked, and may be both coarse and even fibrillary in character. One of the most marked and persistent symptoms of the disease is insomnia, which is constantly present in every case, and it has been the author's experience that where sleep is promptly secured the patient begins at once to gain strength and is soon "out of the woods." The skin is usually bathed in perspiration of a cold, clammy character, most marked upon the extremities, especially the legs. This perspiration has a peculiar—one might almost say characteristic—odor, that is very offensive. It is of an acid, penetrating kind, and very much resembles the odor of the chronic

12 Using Riva-Rocci instrument, broad band.

alcoholic. The digestion is very weak, the sufferer usually having gone for quite a time without eating anything. It is the author's belief that had the drinker taken food freely during his bout the chances are that he would have avoided a terminal stage of delirium tremens. It is not to be expected, however, that an individual under the influence of a toxic agent that robs him of judgment would likely utilize any mental attribute to protect himself against a terminal stage, when it is with difficulty that he protects himself at all. It is difficult to utilize mentality when one has been robbed of it. It should be noted here that there is usually present marked constipation, and that the entire intestinal tract is in a state of intense toxemia. Where the disease runs an unfavorable course and does not subside in from two to five days we usually find that the pulse becomes more frequent and feeble, thin and thready, the tongue brown and parched, the delirium deepens, there is subsultus tendinum and picking at the bedclothes, followed usually by death from exhaustion. This stage may be interrupted occasionally by severe paroxysms.

The prognosis of acute alcoholic delirium depends somewhat upon its degree as well as upon the general vital and resistive powers of the patient. Where we have to deal with those cases which manifest symptoms of nervous agitation, unrest, tremor and apprehensiveness, who partially recognize their condition, a good prognosis can be given, provided absolute control of the patient is obtained. In those cases that might be denominated "frank" delirium tremens, in which the characteristic busy delirium with delusions and hallucinations of fear, tremor, insomnia and temperature under 101° F., we may expect the disease under treatment to disappear in from three to seven days, with a convalescent period of about the same length of time. Those cases that are weak and wasted, whose temperature is high and delirium intense, present a grave problem. All cases are unfavorably influenced in the prognosis by the fact that previous attacks have taken place, by the extent of the continuous drinking between the attacks, by the presence of concurrent diseases, especially if these are organic in character. Among those diseases that influence seriously the prognosis may be mentioned fatty degeneration of the heart, various forms of kidney disease, cirrhosis of the liver, etc. It may be stated in passing, however, that the author has seen in hospital practice some cases recover in which common sense would dictate a speedy and fatal issue, and it is his belief that only 10 per cent. of these cases die, even though so many of them are handicapped by organic changes and by concurrent disease likely to produce death.

The diagnosis of delirium tremens, the "D. T.'s," presents little difficulty; in fact, the layman oftentimes makes the diagnosis before the physician is called, and, recognizing the seriousness of the condition, sends for the medical adviser. Acute alcoholic delirium can

be easily diagnosed by the hallucinations and delusions of terror, by the tremor, temperature, pulse and the general history or appearance of the alcoholic.

Treatment.—In the treatment of these cases, especially in hospitals, sanatoriums and institutions for their care, it should be borne in mind that in the vast majority of cases we are dealing with individuals who are under the most unfavorable circumstances and influences, that their vitality is low, their strength exhausted, and that we may expect treatment to uncover a complication of organic or concurrent disease. This should be borne in mind, as it will make the physician in charge more careful and attentive to his cases if he realizes the gravity that nearly all of them present. We occasionally see persons brought, or who come to us voluntarily, believing that they are on the verge of or threatened with an attack of delirium, and who wish to take the treatment in order that they may avoid the inevitable consequences of their alcoholic life. They know that a short period longer means a severe attack, and their idea is to prevent same. Other cases we see in the shaking stage of a debauch, and who, while they believe they are threatened with delirium, yet actually are not bordering on an attack. The last are those that actually have the fully developed attack in progress. The treatment in these forms is essentially one and the same, and they have been enumerated simply to accentuate the fact that the "borderliner" needs the treatment as badly as the fully developed case.

Three indications stand out preeminently in treatment. It may be stated without fear of equivocation that where they can be secured the case will terminate successfully. These essentials are: The maintenance of the patient's vitality and strength, the overcoming of the motor restlessness and mental agony, and the production of sleep.

Before taking up the consideration of the treatment of these three important elements it is necessary, first, to consider the question of the continuation of the liquor. The author has very definite and well-settled beliefs upon this point, and as he has never in any case seen liquor do a particle of good, but, on the contrary, harm, and as this coincides with good common sense and scientific experience, it certainly is far from rational to make an exception in delirium tremens when we would not do so in any other form of poisoning. Take, for example, a patient suffering from arsenical or strychnia poisoning; would it be considered good judgment to give the individual another dose of arsenic or a hypodermic of strychnia? The matter has always presented itself to me as a strict toxemia; that the sooner we lift the load from off the organism, wash the poison out of the system, the quicker would the patient react, the better would be the result, and it is for this reason that I have never advised the administration of alcohol, but have immediately removed the poison and trusted to

elimination and other methods of stimulation whenever possible. Many writers speak of the reaction that again follows the administration of alcohol, and this is undoubtedly true. We do not wish to add any more strains not have any alcoholic reactions; but the true explanation of why alcohol should not be used is that it is *the poison that is causing the disease*, and every endeavor should be made to eliminate and neutralize rather than add to the already over-toxic state. Not only should the sufferer abstain from alcohol during the treatment of the delirium, but it is an essential necessity afterward.

When a case of delirium tremens is presented for care and consideration it is my universal rule to secure a specimen of the urine for analysis and to immediately administer thirty grains of ammonium chloride or two drachms of the aromatic spirits of ammonia, giving it preferably in a tumbler of very hot water. Usually, where this can be gotten down the patient, its effect will become apparent in fifteen to thirty minutes; during the meantime the patient can be taken to the bath-rooms and there completely disrobed. If possible he should be given five to ten—some authors even recommend twenty—grains of calomel. There is no objection even to a larger dose; in fact, calomel (ten grains), trional or veronal (twenty grains), and capsicum (ten to fifteen minims) may be given at a single dose. The next step is to bathe the patient's face and neck with cold water and place him in the full hot bath, commencing with a temperature of 100° F. rapidly raising this temperature to 110° or even 115° F. for three to five minutes. This bath is of especial value if collapse threatens, being a powerful nerve sedative and vasomotor stimulant. It always requires two attendants, and sometimes three, to successfully carry out this treatment, owing to the fact that manual restraint will be required to get the patient in the bath, to keep him in, and to control him for a short time afterward, or until the influence of the bath and the hypnotic has become noticeable. While in this bath it is a good plan for two of the attendants to rub him well with the hands while the other supports and bathes his head and face with cold water. As elimination is the all-important part, we should endeavor to secure free perspiration, but this may be an exceedingly difficult matter where one has to deal with a pure case of delirium. The ideal method of treating such a case would be to have an electric light bath so arranged that the patient could be placed within its walls, and at the same time the globes protected from being broken by a lattice-work of thin wire. This would allow to a certain extent the muscular movements to be untrammeled and yet obtain the powerful sweating and eliminative influence of the bath. This ideal treatment, however, can rarely if ever be secured. During the hot full bath the patient is given copious draughts of very hot water in order that free diaphoresis may be brought about. It is advantageous

while the patient is in the hot full bath to give the dose of trional or veronal and tincture of capsicum, so that these drugs will be entering the system under favorable circumstances and begin their action by the time the patient is removed from the tub. My experience has been that this treatment will usually quiet the patient to such an extent that he may be removed from the tub, wrapped in a sheet and blanket without making very much objection. The incasing of the patient in the full dry pack continues the effect of the hot full bath and produces perspiration.

The author has never advised nor sanctioned the use of opium, morphine, chloral or hyoscine at this time, as he believes that it is simply an additional toxemia that lowers the vital energy and diminishes the chances of the patient's recovery.

Sometimes the patient cannot be put in the hot full bath; we may then substitute the wet blanket pack, which is applied as follows: A couple of woolen blankets of sufficient size for the pack are placed upon the bed; a blanket of a similar size is then taken and wrung dry out of water at a temperature of 140° to 160° F. and spread upon the two dry blankets; the patient, nude, is immediately placed upon the blanket and rapidly packed according to the method heretofore described. This pack primarily acts in the same stimulating manner as all other heating applications, but as the temperature subsides it becomes a sedative of considerable value, although nothing like as effective as the hot full bath. The patient remains in this pack from three to fifteen minutes, depending upon his condition, at the end of which time he may likewise be removed and packed in the dry blankets as heretofore described after the use of the hot full bath. The full bath should always be given the preference.

Should there be any tendency to collapse or weakness, use the precordial ice-bag and administer internally aromatic spirits of ammonia in one- or two-drachm doses. Never use morphine. Kerr[13] speaks most favorably of the liquor ammoniæ acetatis, frequently repeated, saying: "One is therefore driven to find a medicine which, while operating as soon as may be, to get rid of the accumulation of alcohol in the system, would not by the depression of narcotization or reactionary excitement weaken the *vis medicatrix*, in which latter lies the cure." As soon as we have quieted the patient, he may be removed to bed, where the attendant can watch him until quietly asleep. Fairly good restraint may be obtained by a sheet tied across the bed, by holding down the blanket covering, or by pressing down on the patient near or over the knees, outside of the blankets. The patient is thus allowed, if very restless, to exhaust himself by his continuous muscular efforts. It is not long, however, except in

13 Holden.

severe cases, before the patient becomes quiet, and sleep is here its best and surest restorative. He should be fed every two hours, using some of the malted infant foods, milk and lime-water, raw eggs and milk, koumyss (meat and meat extracts being avoided); a little capsicum added helps. Where ordinary remedies suggested fail, where the patient will not sleep, and is difficult to manage, apomorphine, one-thirtieth to one-twentieth of a grain, may be given hypodermically. These amounts are just sufficient to produce moderate nausea and relaxation, the presence of perspiration indicating its connecting action. The patient relaxes, and soon falls to sleep.

A somewhat limited experience has shown me that the intravenous infusion or subcutaneous injection of saline solution in alcoholic delirium is beneficial. It increases the amount of the circulating medium in which the toxic materials due to defective excretory functions are dissolved, thereby diluting the alcohol and poison and bathing the nerve-centers with a more attenuated solution of the same. The amount of circulating fluids and solids through all the excretory channels is markedly increased, thus carrying off in solution much of the contained toxins. The action of the heart is improved by the filling of the relaxed vessels, physiological equilibrium is restored and oftentimes turns the balance in favor of recovery. Enteroclysis with a hot normal saline solution, retaining the fluid in the bowels as long as possible, favors renal elimination.

In certain cases of moderate severity, those in which the patient is fairly manageable, we may, especially if they are young and free from organic or renal diseases, commence at once with the use of the full wet pack at 65° F., allowing him to remain therein one or two hours. After a short time the temperature of the sheet and pack will rise to 95° F., thus enveloping the patient in a moist vapor at practically a neutral temperature, our aim being to put just sufficient covering over the pack to secure this result. If the face becomes red or flushed, reaction being *full* in the pack, more cover should be removed. Many fall asleep in the pack. Where these cases have needed cleansing an excellent method is to give them a thorough sponging and scrubbing with a flesh-brush, finishing this treatment with a hot full bath at 100° to 105° F. for two to three minutes, removing at once to the pack. In strong cases this gives excellent results. In these, as in all such cases, the bowels must be kept freely open, alkaline diuretics, liquid food, especially the malted milks, and hypnotics administered. These cases will never require mechanical restraint, and, in fact, those who use hydrotherapy will find fewer and fewer cases that do.

Broadbent describes his method as follows: The patient is stripped naked and lies on a blanket over a waterproof sheet. A copious supply of ice-cold water is provided, and a large bath-sponge dripping with the iced water is dashed violently on the face, neck, chest and

body as rapidly as possible. He is then rubbed dry with a rough towel, and the process is repeated a second and a third time. The patient is now turned over and the wet sponge is dashed on the back of the head and down the whole length of the spine two or three times, vigorous friction with a bath towel being employed between the cold-water applications. By the time the patient is dried and made comfortable he will be fast asleep. This I have tried, but the cases upon which it may be used must be robust and free from renal mischief.

As the patient improves, concentrated albuminoid food, broths and light farinaceous diet may be gradually supplied, followed by some variety of white fish, then white meats, and lastly a return to ordinary diet. Peptonized food is excellent at first in some cases. The period of gastric distress may last for a week or ten days, but this is exceptional, most patients having recovered their normal appetite within a week. There are some cases in which the appetite has not failed. In these and in the majority of cases, after the cessation of the gastric troubles, good wholesome meals of meats, vegetables and fruit are the best. It has been alleged by some that a wholly vegetarian dietary is to be preferred. The writer cannot indorse this as an absolute or general rule. He has seen cases which certainly have done well on such a diet, but on the whole a mixed diet of flesh, vegetables, fruits and cereals has been the most satisfactory. In warmer climates the less meat the better. There is much more therapeutic potentiality in diet than is frequently thought, and the best kind of food needed for each patient deserves especial attention. Though the writer has not seen juicy fruits cure drunkenness, he has seen them aid powerfully in the cure of inebriety. The natural fruit juices tend to allay, if not to quench, the great thirst which some inebriates experience when they are in the throes of the dyspeptic miseries following a bout of intoxication, besides having a depurative influence on the blood.

Acute Alcoholic Mania.

Acute alcoholic mania (*mania à potu*) is a maniacal attack, transient in character, and brought about through the toxic action of alcohol upon the cerebral tissues. The amount of alcohol ingested bears no relation to the disease, in some cases small amounts only being required to produce an attack. It occurs with comparative rarity in inebriates, probably because their tissues have become more or less habituated to the use of liquor. The attack usually commences without warning, although there are differences in this respect. It is a common occurrence in a mild form, for we notice that a man who is drinking is simply "spoiling for a fight," "carrying a chip on his shoulder," and who will upon the slightest provocation break out

into an attack of mania. This condition is literally a mania of violence, with little or none of the tremor or hallucinations found in alcoholic delirium. The patient, like the maniac, is unconscious of his surroundings, and infuriated utterly beyond the power of his control, which may even at times extend to the point of attempted homicide. This temporary madness often results in the man severely pounding his wife, beating his children, smashing the furniture, driving every one from the house, throwing things from the window, or suddenly beating an innocent and inoffensive bystander, striking an animal—in fact, indulging in almost any insane maniacal act. When brought to the hospital he is in a wild, ungovernable fury, striking at his guardians, kicking, shouting, stamping, and with great difficulty controlled. The face is flushed and engorged, the veins and blood-vessels standing out prominently upon the face, the eyes wild and rolling, the muscles enormously strengthened and at the highest point of tension; in fact, he presents all the symptoms of a wild and uncontrollable attack of true non-alcoholic mania. This attack may last from a few minutes to many hours and even days, with intermissions. These are the cases that furnish a great many of the "drunks" that are brought before the police courts for adjudication; they form a large class of offenders against person and property.

The *pathology* of such a disease must unquestionably be that of an acute toxemia acting upon peculiarly unstable and excitable psychic and motor centers in the brain.

The *prognosis* is usually good, and much more favorable than in ordinary acute mania, as the paroxysm passes rapidly away, leaving the patient exhausted and worn out. Relapses may occur if alcohol is continued.

Treatment is based largely upon the condition of the patient: in some instances the violence is so great that it is with difficulty that anything much can be done until this is relieved. It has been the author's uniform rule to relax and quiet these patients by the use of apomorphine in one-twelfth to one-tenth grain doses, which usually have the effect of causing nausea and prompt vomiting. This cleanses the stomach and reduces rapidly the violent symptoms. As soon as the patient is quieted the same line of treatment that has been outlined in acute alcoholic intoxication should be followed. In this disease, during its acute stage, nothing will be found equal to nor take the place of the full wet pack at 65° F. for one hour, followed by a rapid cold sponge. The after-treatment is identically the same, and it may be remarked, in conclusion, that the only way by which this disorder may be avoided is the practice of complete and absolute abstention from liquor. The fact that the individual has had an attack of acute alcoholic mania justifies one in exercising every possible

medical and moral power to impress the need of not only temperance but abstinence.

Chronic Alcoholism.

By chronic alcoholism is meant the continuous or nearly continuous use of alcoholic beverages. They form the class known as chronic drunkards or drinkers, and show most plainly the pathological changes. They range from the confirmed "sot," who is the constant inmate of almshouses, workhouses and jails, to the "gentlemanly" drinker who only at times needs the assistance of friends, but who, nevertheless, is treading the same weary and certain road.

Drunkenness—that is, chronic alcoholism—should be plainly and clearly differentiated from inebriety. Drunkards drink whenever opportunity offers, but the inebriate, nervously diseased, drinks only as the nerve storm passes over him. The drunkard gradually injures the structures of the brain and body, their functional activity; the inebriate is one who is diseased, born with a brain that is truly unsound. Certain drunkards may be inebriates—that is to say, the neurosis may be superimposed upon the chronic state.

In the chronic alcoholic the first symptoms are usually those of a nervous character, tremor of the upper and lower limbs, that of the hands being most noticeable. There are neuritic pains in the extremities (a perineuritis?), characterized by pains, paroxysmal, intermittent or constant, together with a numbness of feeling, as though the fingers or toes were enlarged or swollen. These are most common at night, and appear after undue fatigue or over-exertion. Feelings of extreme coldness, heat, twitchings, stabbings, indefinable uneasiness, are experienced all over the body, especially in the back, legs and feet, shoulders and arms. My experience is that they never get better until complete cessation of liquor is secured and free elimination brought about. Sensation may be much delayed and a mild anesthesia developed. In addition to these symptoms, the legs are weak, there may be some ataxia and a tendency to give down. The lower limbs may show some wasting. Insomnia is one of the most troublesome and persistent of the symptoms, its improvement a good sign. The alcoholic, on retiring, finds himself nervous, restless and desirous of something that will quiet—that is, narcotize—in order to secure sleep. If he becomes quiet and starts to sleep, he will be often awakened by a jerk or start of such severity as to arouse, annoy and upset him completely. There is vertigo, headache, nervousness, *muscæ volitantes*, *tinnitus aurium et cerebri*. The mental state has been fully dwelt upon, but the mental disquietude without liquor, the fleeting delusions, the untruth, the suspicions, are all characteristic.

Nausea, morning vomiting attendant upon the chronic gastritis, the coated tongue, the foul, sour breath, the epigastric "sinking," are

nearly always present. The eyes are watery, the skin red and pimply, the nose bottled. In the liquor drinker we may have emaciation, in the malt over the "bloat." In fact, it may be said that in the fully developed case we will find morning nausea or vomiting, coated tongue and foul breath, gastritis, headache, dizziness, insomnia, restlessness, fears, perverted sensations, untruth, tremors, shuffling, ataxic gait and bloated, puffy or pinched features.

The tongue is coated, the mouth red and irritated, the breath foul and sour. There is nausea, weight, eructations, vomiting, pyrosis, gastralgia and other serious manifestations of such extent and gravity as to make him uncomfortable, his life a misery, and often themselves serve as a cause for the further ingestion of alcohol. The secretions of the intestines gradually lose their digestive powers, their muscular structures deteriorate, and as a result intestinal indigestion and chronic constipation soon supervene. The liver becomes "torpid," its secretions are precipitated, and owing to the lack of bile the feces become clay- or putty-colored. The important function of separating the digestive toxins fails, and there is filtered into the blood stream large quantities of these products. The lower intestine itself becomes deteriorated, either enlarged and fatty or contracted and cirrhosed.

Though there is not the acute pain and distress of acute alcoholic attacks, still the system is slowly but surely undergoing a thorough narcotization of the tissues. The influence is such as to degrade silently and steadily the function and structure of each organ and tissue, changing the normal or physiological processes of break-down and repair into pathological ones, at the base of which there is a constant double toxemia.

The heart is constantly overacting, and by the specific action of alcohol on the structures of the muscular tissue is weakened. As a result, the drinker becomes "short-winded," easily fatigued and unable to stand exertion. He puffs and blows when he runs a short distance or climbs stairs.

In beer and other malt liquor drunkards, the subject even at an early stage has a tendency to obesity, which, as the disease advances, becomes more prominent; he acquires a bloated and inflated appearance. The features are heavy and dull, the skin of the face red and somewhat of a purply hue, especially on exertion, with vascular hypertrophy, most conspicuous in the region of the eyes and nose. There are blotches, an oily, greasy, glistening surface, conjunctival yellowness (bilious or fatty), the eyes moist and red. In the early stages the beer drinker may be quick and active, but gradually his gait loses much of its elasticity. Dropsy, syncope or embolism frequently closes the scene in middle life. Spirit-drinkers, as a rule, are more shrunken in aspect, and often grow thinner the longer they continue their deep potations, till in many cases they are quite emaciated.

From their liability to cirrhosis of the liver and kidneys and to cardiac fatty degeneration, they often display, as the disease advances, the abdominal roundity of ascites.

Treatment.—In the consideration of the treatment of chronic alcoholism the physician must possess two factors to make him successful in the management of these cases. One is that of example, the other that of sufficient personality to control and manage patients. He who possesses a *past record* in this disease is *not the one*, for precept backed by example is one of the most powerfully suggestive agencies that the physician can command. If the medical staff and other officers are abstainers, so much the better. The author cannot understand how any enlightened medical practitioner, who has the well-being of his cases at heart, can be other than a total abstainer. The quiet example of the physician or the members of a private medical household taking such a patient has often a deeper influence on the afflicted inmate in confirming his good resolutions and strengthening his will than any amount of prescriptions and physic, for the medical adviser's practice of "moderate" drinking confirms in the alcoholic the morbid desire and impulse. One must at least come into court with clean hands.

The essential basic requirements are the absolute withdrawal of drink, perfect control of the drinker, his ready acquiescence in the treatment, and sufficient time in which to perfect the cure. The absolute, immediate and unconditional withdrawal of all alcoholic stimulants, whether spirits, wines, beers, malt or ciders, must be secured. After much personal experience, to which may be added the results in prisons, workhouses, hospitals and homes for alcoholics, has not alone shown that immediate withdrawal is safe, but that "tapering" is merely adding to the misery. In this respect there is a marked difference between alcohol and drug addictions. By its prompt and immediate withdrawal we remove the exciting cause, and through hydrotherapy prevent many of the discomforts that would otherwise ensue.

In no class of cases is a more close study of the personal equation called for than in these people, for one case is radically different from another, so much so as to warrant most careful investigation. Individual peculiarities, the direct and indirect action of alcohol on the tissues, the degeneration and structural defects caused by its use, all combine to raise questions of grave import to physician and patient. Nothing can be accomplished in the confirmed drinker unless perfect control of his time and movements is secured. This is best accomplished not by locking him up in a ward or hospital, but by the personal care a special nurse or attendant can give. In addition to the companionship and cheering influence of the presence of another person, we can in this way be certain of his not surrep-

titiously receiving alcohol. This control by personal supervision should be kept up until the alcoholic is well convalesced. There is oftentimes urged the cost of such a method, but this does not change the fact that it is the very best way. By it the man is permitted a certain freedom and activity that helps to prevent the tedium of the "cure," for it enables him to sit out of doors, take walks, read, talk, and through this companionship we may, by the nurse's example and teaching, instill non-alcoholic ideas. Where there is ready acquiescence in the treatment and a reasonable interest in its outcome, we may expect much more rapid progress from the methods here suggested. Of all the elements needed to secure the end desired, time is one of the most important, for with ample time, perfect control and proper treatment much can be promised, even those alcoholics whose case looks unpromising, but without this one element little hope of permanent good can be held out. We may tide over the acute attacks, may straighten out the chronic alcoholic, but return is almost certain unless we have *time* to bring into play all those elements, psychic, moral, religious, physical and physiological, that constitute the sum total of treatment. The mental training of these cases is a factor that is as essential as the physical, good and proper ideas being needed as well as physiological functions free from toxins.

It is a much more arduous undertaking to treat an alcoholist of ten to twenty years' than one of one or two years' standing. Hence treatment should be applied at as early a stage as possible, an axiom which most alcoholists and their relations fail to act upon.

One remark applies to all rapid "cures" or processes, known and unknown. A diseased condition of the brain, such as is possessed by the alcoholic, cannot be reconstructed within a few days or weeks. In from one to two weeks nearly all are helped and ready to testify that they are cured, but experience shows a preponderating majority of relapses. The mere fact of a rapid "cure" being claimed ought to call forth strict caution and deliberation, especially in cases of long standing. Weeks and even months are required for the elimination of the poison and the correction of the actual mischief done to organ and tissue, during and after which the structure must be built up anew of sound healthy tissue—a labor of time. If all this can be accomplished when the patient is following his usual calling, so much the better. When the alcoholist has to be sent from home it is an imperative obligation to recommend, if this be within the physician's power, only an establishment which is intelligently conducted on lines consonant with the teachings of physiology and pathology.

The claims so frequently and persistently urged on behalf of any drug-combination, that it is an absolute or nearly absolute cure, in the writer's opinion may at once be dismissed. There is and can be no specific for the "cure" of alcoholism, and any medicinal or

other preparations for which such a claim is alleged, in all probability have been long found useful, not as specifics, but as serviceable in improving the tone of the brain and nervous system. If we are going to urge "specifics" (?), or some single process or drug, it were much better to proclaim some open method possessing powerful physiological attributes, such as hydrotherapy, than any secret method consisting of some undisclosed formula of potent and powerful drugs in doses *per oram* or hypodermically, the strength of which is unknown.

These patients, upon entering sanatoria or institutions designed for their reception, possess, as a rule, very inactive skins, sometimes are even dirty, so that the first step in the hydrotherapeutic management of the case should be the administration of the hot full bath at a temperature of 100° to 104° F., during which the patient should be scrubbed from head to foot with a rubber or flesh-brush, accompanied by the free use of green soap. This bath will cleanse the patient thoroughly, remove the accumulated epithelial débris from the surface, and stimulate the secretions as well as the circulatory activity. The bath should be followed by a hypodermic of strychnia and atropia and the internal administration of liquor ammoniæ acetatis. If the patient possesses sufficient strength, the administration of the full bath should be continued daily, or, what is far better, the electric light bath, followed by the horizontal rain bath at a temperature of 104° F. for one to one and one-half minutes, pressure twenty-five to thirty pounds, rapidly reduced to 80° F. for one-fourth minute. Gradually reduce the temperature to 70° F. by decreasing one or two degrees daily. In these cases the Turkish bath has proved to be of value, especially at the commencement of treatment, although it should be administered strictly upon the physician's prescription.

Vomiting and gastritis are best met by the prompt use of lavage, followed by, in some cases, teaspoonful sips of very hot water, or shaved ice and some carbonated water, such as Vichy. Nothing in the writer's experience, however, has proved so satisfactory as the combination of the above with the use of the fomentation applied over the stomach and abdomen for ten minutes, repeated, and in its turn followed by the ice-bag over a compress, applied to the epigastrium.

Insomnia may be met by the use of the wet pack at 70° F., duration thirty minutes, increased five to ten minutes nightly until sixty minutes has been attained. The author has had satisfaction from the use of the neutral full bath, duration thirty to sixty minutes, at a temperature of 94° F., just before bedtime. Where this treatment cannot be carried out the alternate hot and cold sponge to the spine will sometimes bring about prompt response. It may be said in passing that general nutritional treatment of the case will relieve insomnia.

Craving for alcohol is best overcome by general reconstruction of the patient and the use of fruits and fruit drinks, carbonated water, and tonics containing nux vomica, capsicum and gentian. Caffeina, one to two grains every hour, will materially aid in suppressing the desire. It must be borne in mind clearly and distinctly that disgusting the alcoholic is not curing him of the desire for stimulants. This stage of treatment usually lasts from ten to fourteen days.

The second stage of the treatment is that of elimination and reconstruction, and the management of this stage has to be varied according as we have to deal with the presence of nephritis and arterial sclerosis. Where these exist we must be very cautious in using cold water and strong percutient measures. Reference should be made to the sections wherein these diseases are treated, in addition to that here outlined. Where it is desired to secure powerful sweating effects without weakening the patient, we must commence with the daily use of the electric light bath, full strength, to free perspiration, followed by the hot full bath at 100° to 104° F. for five minutes, sometimes ten. The patient is then to be removed to the blanket pack, the edges of his hair well dried, and permitted to perspire. After several days' treatment the use of the electric light bath until free perspiration takes place should be instituted, followed by the horizontal rain bath at 104° F. for one and one-half minutes, reduced to 80° F. for one-fourth minute, pressure twenty pounds. Reduce the temperature one degree and increase the pressure one pound daily until 70° F. and thirty pounds' pressure are reached. The final treatment consists in the following, and should be used only with patients who are strong and robust, who have no cardiac or renal disease, and only administered after the full development of the reactive power has been established: Electric light bath until free perspiration takes place, followed by the horizontal rain bath at 102° to 104° F. for one to one and one-half minutes, pressure thirty pounds; this to be followed by the jet douche at 65° F., pressure thirty pounds, applied to the spine and the posterior aspect of the lower limbs for ten seconds, the treatment being finished by applying the fan douche gently to the sternum. As the psychic and bodily functions respond to the treatment, and normal body and brain activity returns, we must urge systematic use of both these functions, which are so essential to a proper and permanent recovery.

Men and women present difficulties peculiar, so to speak, to their sexual difference. The former can have walking and riding, manual toil and manly exercises; the latter walking, with lighter occupations, such as sewing, wood-carving and the like. Both sexes can read, write, draw, paint, photograph, play on musical instruments, and so on. Among the mechanical classes and the poor, the men can dig,

garden, do house decorating, remunerative work, and other light duties, for "the idle brain (and hands) is the devil's workshop." Methodical occupying of the mind with the performance of daily duties is the only effectual means of withdrawing the alcoholic from his morbid brooding over his misdeeds and miseries, and thus powerfully aiding in making him once more "a whole man" in fair possession of self-restraint and inhibition.

Too much care cannot be given to the strengthening of the will-power, for the temptation to drink will be very strong, and for this reason after recovery the patient should avoid those of his associates who cater to his weakness, and made to enjoy, if possible, the company of those who, on the contrary, tend to counteract his habits.

It may not be amiss to refer to the extraordinary mental temperance waves or revivals which have, every now and then, passed over a whole State or country, and have apparently swept away in their ardor for abstinence all the alcoholists in the community. These neurotic temperance waves have all flowed and ebbed, leaving behind them on the sands of the nations, as they receded, a fair salvage, though but small proportion of the original number of recovered. The many victims who have taken the teetotal pledge over and over again, or who have even publicly testified to religious influences or drug preparations having destroyed their drink crave so utterly that they could not drink an intoxicant again, and yet who have returned to their former alcoholic indulgence, negative the existence of such an antidote, while the hundreds and thousands of reformed drunkards, who by moral, religious or selfish motives alone have overcome and stood firm in their abstinence, attest the fact that the confirmed alcoholist can be and has been cured by a resolute effort of the will.

Hypnotic suggestion has been spoken of by some in quieting and preventing the drink impulse, craze or craze, but the writer has seen so many alcoholics with whom this process has failed that, apart from the many objections which have been fairly urged against it, he cannot recommend hypnotism save as an after-adjunct.

The reason ought to be enlisted in the treatment, which is best attempted by sound teaching concerning the fallacy of the prevalent belief, in all classes of society, in the virtues of alcohol as a beverage, and concerning that potent drug's benumbing influence on the senses, its undermining action in structurally degrading organ and tissue, its irritant inflammation of the texture of vital organs. The public should be especially grounded in the truth as to the non-necessity and valuelessness of alcoholic intoxicants as an article of ordinary diet. No pains should be spared to impress upon users the need of abstinence from all intoxicants. To help to attain this end we should enlist the influence of culture, music, the fine arts, high-toned morality and

pure, undefiled religion to strengthen the self-respect, fortify volition and increase inhibition.

Inebriety.

Inebriety is a periodical, overpowering and instinctive morbid impulse, craze or craving which drives certain individuals to drink to excess; a central disease, a dominating malady; a crave not for alcohol, but for stimulation, intoxication, anesthesia, or satisfaction afforded by drink. The periodicity may vary from a few hours, making it nearly constant, or it may be weekly, fortnightly, monthly, quarterly, or semi-annually; may follow a heavy day's strain or excessive mail, or be associated with atmospheric and climatological conditions. In women the greatest tendency to inebriate outbreaks is associated with the menstrual period, the uncontrollable impulse lasting several days, this alone satisfying the intense and morbid desire of the central nervous system. Others, again, will not drink until the few days that follow the period, the flow itself seeming to have given relief, its cessation being the immediate cause. In several instances I have been fully satisfied that the perturbation in these cases during the menstrual period has been such for the time being as to temporarily upset the mental equilibrium and abolish control. During the passage of the cyclonic nerve storm the nervous system is so upset that some anesthetic is badly needed, and drink promptly gives relief. These cases are favorable to treat, for by care to avoid stimulants at the time of menstruation we may expect the impulse and desire to gradually fade and lessen until the individual passes into a stage of equilibrium or normality. Under strains and stresses it may again return during the period, when added watchfulness will be needed to ward off a drunken attack or bout.

The inebriate frequently has premonitory warnings of the oncoming storm; he should take advantage of them, seek the physician's care and treatment, the result of which would be the gradual breaking up of the neurosis and relief. Inebriates, as a rule, do not heed these warnings, but, following the impulse, turn to drink. The premonitory symptoms are usually those of more or less increasing nervousness, a motor restlessness, insomnia, bad dreams, fears, suspicions of others, dreads, indefinable feelings of impending calamity, loss of appetite or hurried eating, constipation, etc. Mental inability and "touchiness" are very common. In some cases it comes apparently as a lightning stroke out of a clear sky, followed by an immediate tendency to drink. Some inebriates are solitary in their indulgence; others—and these form the larger majority—are of a social or convivial tendency, and seek not alone the pleasure and gratification of the intense desire for stimulation, but boon companions in whose society they derive added pleasure.

The inebriate, while differing from the chronic alcoholic in many ways, yet possesses many features in common, and he may by proper treatment, both somatic and psychic, be trained as a total abstainer and continue such. The writer has seen cases with the worst kind of family histories, neurotic heredity, poor training, and yet these persons, severely handicapped in their struggle, have made good recoveries and remained non-users for the remainder of their lives. For this reason they should be encouraged to make the fight, for with the feeling of strong hope for cure much can be done. Too often we hear the note of despair: "What hope is there for me? I have inherited from my parents the drink habit, and it is useless for me to try." Even the unpromising break the thralldom, so we should give these the courage that paralyzed brains need.

In treatment the same principles are involved in the care of the inebriate as the chronic alcoholic, and the remarks made there apply here. It has always seemed to me that we should give the inebriate, if possible, a great deal of "mental attention," for we can frequently by this psychic treatment change the drift of his whole mentality. My observation leads me to believe that a longer time and more attention is required to treat these cases.

Prophylaxis of Alcoholism.—This is one of the broadest subjects in the range of medicine, and involves to a certain extent the changing of the attitude of young men and women to the present prevailing ideas. When it shall be considered "bad form" for both sexes to drink in public cafés, or to touch liquor of any kind, a great step forward will be taken. The reduction of the use of alcohol means the lessening of the great "white plague," tuberculosis, a no small item in itself.

The young should be taught that alcohol is a poison to mind, body and morals; that its use is needless and fraught with danger, especially at a tender age. It should be taught that it possesses no food value at all, but that it depraves all bodily and mental processes; that woman's virtue and man's honor have passed from them while under its moral benumbing influence, not because of the innate weakness or moral turpitude, but because of the alcoholic's incapacity to see and appreciate at its true value the acts done under its influence. From the cradle up, the mother and nurse should avoid the cry-soothing "toddy," that ruins the tender infantile tissues and tends to make an alcoholic at the adult period of life. I am satisfied that if a propaganda of abstinence were as closely pressed as the idea of the "manliness" of drinking, we should soon find the young men throwing off the yoke. The restriction of the sale, the limitation of the bar-room night hours, would likewise lessen some of the unfortunate sequelæ of drinking.

Local option or national prohibition would be useful adjuncts.

The final word for prophylaxis for future attacks in one who has developed alcoholism or inebriety should include a long seclusion in some special institution, for they are, as a rule, too will-paralyzed to regain health in a few short weeks.

State control of inebriates and alcoholics must surely come as a matter of economy, both in actual cost to the State and the loss of time to the individual. The hope is indulged that these facts will eventually be impressed upon the minds of legislators.

CHAPTER XXII.

THE REARING OF THE DELICATE, TUBERCULAR AND NEUROPATHIC CHILD.

It was Oliver Wendell Holmes who said that the education of a child should be begun two hundred years before it was born. The more one ponders upon the plain facts of inheritance the more he is apt to come to the conclusion that too much care cannot be spent in the training of normal and healthy children, and this becomes doubly true with regard to the peculiar unfortunates the subject of this chapter. Their proper rearing would contribute quite as much to the alleviation of human suffering and disappointment as any other factor. The first important element is a rational and first-rate parent. This fact enters very little into the consideration of parties who are considering marriage.

Childhood is the plastic and formative period of existence; it is the stage in the mental and physical make-up of the child that we must keep straight and strong, for "as the twig is bent the tree is inclined." The delicate, tubercular and neuropathic child is, as a rule, thin and anemic, nervous and restless, sensitive to physical pain and suffering, lacking physical courage, never "rough it" with their companions, seek quiet, seclusion and the companionship of women. Psychologically, they are what would be termed "peculiar"; their little brains sensitive to impressions; precocious, with too vivid and capacious imaginations; variable and timorous; giving way to trifles, cry easily. They lack that normal strength that knows no fear, either of self or God, of man or the future, or of to-morrow; for normal children should never think of pain, of hygienic laws, or organs, but should be without fear of dark, thunder, spirits, devils, burglars, fairies or their like.

The physical and moral education of the child is to be so conducted as to result in a harmonious development of body and brain. These children should first of all be given physical education, in order that their bodies may be strong, mental education afterwards in proportion to their physical strength and capacity. They must not be required to conform to the fixed formula of the pedagogue.

A high degree of physical strength and endurance is absolutely incompatible with the tubercular, delicate and neuropathic. In the development of the physical capacity of these children, out-door life in the country, with its superabundance of fresh air and sunlight, with its incentives for physical exercise and exertion, is undoubtedly the

life that is most conducive to strength, rather than the life of the crowded city, with its limitations. It may be supplemented by the judicious use of gymnastic exercise to overcome physical discrepancies and weaknesses.

Mental and moral control is essential, and to this end training should start in the cradle. With the growth of the child self-control and restraint must be carefully inculcated. He should be taught to accept without black looks or resentment adverse decisions to his pleasures, and to be made to understand Tennyson's lines, "Theirs not to reason why, theirs but to do or die." He should be taught to stand teasing and to control a hasty temper, to stamp out sulking, learn to take lumber as well as give it, and to present a smiling face and a determined will even under disappointment and failure. This is a part of the iron school of experience.

Obedience should be exacted in spirit and to the letter. The best general is made out of the timber of the soldier that can best obey, and so it is with children; a lack of obedience will but lead to a laying up of trouble in the future for parent and child. Many children and adults possess a certain physical courage and are yet lacking on the moral side. It is this moral courage that is oftentimes among the most beautiful of the traits of humanity, and where acquired in early youth becomes as a golden skein running through the individual's entire life.

Self-confidence and decision of character mark the difference between the real man or woman and the vacillating weakling. To be able to reach a prompt and early decision and strictly follow out the lines decided upon without "post-morteming" every result decided, will unquestionably have a tendency to lengthen life and make it more happy, for there are hundreds of neurotics who are literally torn to tatters by deciding and reconsidering decisions, reopening settled questions until they almost reach a state of morbid doubt. The prompt and definite decision, even though adverse, is better than the decision that it is known can be easily unsettled.

Bad habits, mental, moral, bodily and sexual, must be closely watched and promptly overcome by explanation, precept, suggestion and example, and this would include the necessity for eradicating such habits as nail biting, grimaces, blinking and others of a far more serious nature. While many of these habits are not of themselves injurious, still they present, from an esthetic standpoint, objectionable features and tend to mar the child's composure. Their restraint is doubly valuable and desirable, for with it must come strengthening of the will, and in this way better control secured through inhibition processes. The habit of unsociability is to be promptly squelched, and the child and youth taught that human beings are naturally associative animals, and that all through life companionship of our fellows is necessary to our existence and happiness, and that where we

refuse to associate we are laying up potent opportunities for personal unhappiness.

A certain appreciation of one's value is not bad, but overbearing egotism is unendurable in any one. No man has accomplished so much in his short span of three-score years and ten that he can permit himself to believe that his hat-band has increased several sizes. We should remember that Newton, the discoverer of gravitation, said he felt he had only "wandered down to the sea of knowledge and picked up a few pebbles from the beach."

To be the focus of every thought within the household, to be the pivotal center from which all ideas radiate and from which all movements turn, is a position for a youngster that is positively certain to develop in him a distorted view of himself and things in general about him. A dangerous foe to these children is worry, which, terrible enough in adults, is simply indescribable in the child; the formation of such a habit exhausts physical and nervous reserve forces; the chafing against useless and needless things is bound to develop a selfishness and capriciousness that is hard to eradicate. Unless early control is exercised and that noblest of all desires, to do for and help others, carefully taught, he will become in later years a menace to himself and hopelessly disagreeable to those with whom he is associating.

Early in life children should be taught the necessity of labor; it is the heritage of men and women. Says Patrick: "Labor may have been a calamity for Adam and Eve. Nowadays it is no curse, but the bright, true star of health and happiness. To work with enthusiasm is to form the very essence of a vigorous existence." No one knows better than the physician of long experience that many a man and many a woman would be a great deal better if some consuming occupation took their time. Labor in a child of tender years may be encompassed under the word play, and we should urge that boys and girls play hard, especially delicate ones; let them get tired, let them rest, for after all the child should be a great deal of the animal; eat, play and sleep. It can be said of the human frame that it was constituted for work and play, and a failure to follow out the ordained lines of physiology is to cultivate its shady side—pathology.

In the management of these children *ideal* would place them in the country, with plenty of fresh air and all the incentives that come from fresh fields, pastures green, birds and babbling brooks—in fact, a place where the human being can come in close contact with his Maker. Sturdy companions the child should find, whose healthy exuberance and active play make the day seem short and pleasant; books and studies to form a secondary part of the training and to be of practical character; not too much morals and not too much religion. A remark of this kind is always misinterpreted. I would

state that the growing mind should be taught beautiful thoughts and living, the facts of true religion, and not be threatened, tired or bored with flaming ideas of eternal damnation.

The diet should be mixed, abundant, and consist of cereals, fruits, carbohydrates, vegetables and a moderate amount of meat. Three meals a day, supplemented, if necessary, by an occasional lunch, will help the child to a better nutrition and to take on flesh.

It is a natural thing for children under puberty to be little pigs, and it should be remembered that little pigs are frequently fed, and this may account for their usual roly-poly appearance. Children are to be given as few drugs as possible, opiates rarely, and alcohol never. The idea of permitting a child to be "finicky" in his likes and dislikes for food placed upon the table is out of the question. Children should be made to eat something of *everything* that is known to be beneficial, and in that way cultivate a reasonable and rational appetite and liking for food.

Nothing less than ten, and, better, twelve, hours' sleep should be exacted from the growing child, and ten hours would be an excellent allowance for some of the youths just *over* puberty, who begin to think that they know more than their elders as to what is good *for* them. They should sleep upon hard mattresses and in well-ventilated rooms.

Taken as a whole, the girl suffers more than the boy from the restraint that her elders exercise in her control. When she feels the necessity of running off some of her superfluous energy she is told that such actions are awkward and ungraceful, and is ordered to sit quietly, properly and primly in a chair, with her hands folded in her lap "like a perfect lady," and it is probably due to some of this training that we to-day find so many delicate, neuropathic women. It is certainly a great factor in making the female sex much more emotional than the male. *Per contra*, if the boy desires to let loose any superfluous energy he may have, he is ordered out of sight and told not to annoy his male or female elders, and finds relief in the active companionship of his friends and comrades. This is kept up more or less during the entire life of the two sexes.

It is the author's opinion that of all the factors that go to make up the management of the rearing of these children hydrotherapy is by far the most important. Its powerful tonic effect, its anesthetic influence upon the nervous system, its action upon digestion, assimilation, elimination and growth, mental, moral and physical, is unquestioned and powerful. A question recently addressed to a champion pugilist as to what he considered the one thing that prevented him suffering pain from the blows of his adversary, was instantly answered as "cold water," and the explanation that followed was the layman's explanation of the physiological action of cold water upon the organism. Children from early life should be taught to stand

any quantity of very cold water, and made to acquire the habit of taking cold baths.

These children should be reared by parents who are constantly instructed by the physician concerning the measures they should adopt with a view of meeting the conditions present in the child's particular case. All treatment must in the end be based upon the age, constitution and reactive capacity of the particular child, after a most careful consideration of all the facts of the case, supplemented by a careful physical examination. Children under hydriatics should begin to respond within two weeks, but where colds, sore throat, loss of appetite, insomnia, mental irritability and acute intestinal affections make their appearance, it is an intimation of the failure of the hydriatist to adopt proper measures, a too rapid change in temperature, or a poor reaction.

The infant must be bathed with a due regard to the sensitiveness of its tender tissues and kept warm at all times. During the latter months of the first year the warm cleansing bath may be followed by a tepid or cool sponge at 85° to 80° F., rapidly performed, the bath being terminated by friction with the hand; it is a useful method. When the infant is a year old we may commence the use of stimulating cold measures, provided we secure tonic reaction; these measures should be kept up for the rest of the individual's life. Just because cold water is used does not prevent one being sensible and judicious in not exposing their children to inclement weather. A little admixture of brains with hydrotherapy is oftentimes a useful combination. The application should be made once daily in a warm room on arising, best, however, at bedtime. The following plan will be found most excellent for young children who are growing up, or for those whom we are commencing to train to stand tonic cold applications: Commence with the cold sponge at 90° F., followed by a rapid drying with a rough towel until the skin "pinks." Reduce the temperature one degree daily until 75° F. is reached; a brief oil rub will be found a valuable addition, especially in infants and children who are much run down in health. When they *begin to react*, use the warm full bath at 100° to 102° F. three times weekly, followed by the cold sponge at 60° F., rapidly performed, the whole being terminated with friction from a crash towel. Three times a week soap may be employed with advantage immediately after immersion in the warm bath.

As the child grows and develops, or as reaction is established, the use of the salt rub, followed by the full warm bath and cold shower at 70° to 60° F., will be found to be one of the best home measures that can be employed in these cases. Where the shower cannot be obtained, the affusion to the chest, back and spine, while sitting in about four inches of warm water, may be used as a substitute.

The author is again constrained to remark that a shower bath in a home where there are growing children is of far greater use and importance than many pieces of virtu or bric-a-brac. That it is imperative in those families that have delicate, tubercular and neuropathic children, goes without saying. Its use is *equally applicable* to girls and boys, and will insure good health to children, youths and adults, more so than any other known procedure in the broad field of therapeutics. It is especially to be recommended to girls, and where its vasomotor tonic influence is early established there is no rhyme or reason why the girl should discontinue the daily use of such a bath after the establishment or even during the menstrual flow. When the present lack of intelligence regarding the value of cold water as a tonic reconstructor has been overcome we may begin to hope that the American nation will take steps forward in the prevention of these pitiable cases. The cold plunge may be employed at 60° to 65° F., but it does not in any sense exercise the same beneficial influence as the shower. It is too much of a shock.

In summer both sexes should be urged to swim, as we have in this method a combination of active exercise with tonic effects of the cold water upon the periphery. Surf bathing is most excellent, and many a delicate child has had the foundation and betterment of health to date from a visit to the seashore. The use of cold surf bathing, with its attendant pleasures, should be allowed with due regard to the rules that have been previously laid down. In cities this treatment is even more necessary, and is to be supplemented by instruction in gymnastics and exercises under some competent instructor. All exercises are to be followed by the warm cleansing bath or warm shower, and this by the cold shower or rain bath where accessible. Many individuals soon learn to stand temperatures as low as 40° or 50° F., and though the application is for the second disagreeable, the after-effects are so pleasant, the exuberance so delightful, that they continue its use as a method of health-preservation.

In conclusion, it may be said that through the use of tonic hydrotherapy the mental, moral and psychical fiber is strengthened and toughened, to resist the encroachments of passion and disease.

CHAPTER XXIII.

DISEASES OF WOMEN.

Vulvitis.

Vulvitis is an inflammation of the vulva, and may be simple, purulent or follicular. Simple vulvitis originates for the most part as a result of local irritation or filth, from acrid discharges from the uterus and vagina, from decomposing secretions, from friction, scratching, and as a result of masturbation. Purulent vulvitis is usually the result of gonorrheal infection or a simple vulvitis that has become infected. Erosion or ulceration are not uncommon results. The perineum and inner surfaces of the thighs may participate in the inflammation and become excoriated. The follicles become involved in the follicular variety. It occurs sometimes in girls and young children, especially where they are much run down.

The first element in the treatment of this condition is the establishment of absolute local cleanliness, which should be followed by the use of the hot vaginal douche, using an alkaline antiseptic, bichloride or permanganate of potassium solution. Where the inflammation is excessive and the parts hot and feverish we may apply the continuous cold-water coil or Leiter's tubes molded to the parts. Rectal irrigation with hot saline will sometimes do much to relieve local distress. The most satisfactory hydrotherapeutic application is the hot sitz bath at 104° to 110°, even 115° F. if possible, for ten minutes, repeated three or four times during the twenty-four hours. An excellent scheme of treatment is to use the sitz bath, followed by the vaginal douche, drying the parts and dressing them with zinc stearate. Keep the parts separated by the use of dry gauze pledgets.

Pruritus Vulvæ.

This is an itching of the vulva, usually unattended with any apparent definite lesion. The most common causes are acrid discharges from the uterus and vagina, from acid or diabetic urine, pelvic inflammation, ill-fitting clothes, habitual constipation, masturbation, excessive venery, reflex nervous influences, etc. It may become so severe as to cause the sufferer to become a recluse from society. Scratching may increase irritation and cause abrasions, with subsequent infection. It is aggravated by over-exercise, stimulants, overeating, warmth of the bed and over-sexual indulgence. It may cause

loss of sleep appetite and strength until the health becomes undermined. Some cases become so morbid as to deprive the unfortunate woman of her mental balance.

If any causal factor can be found, remove this at once. While we are using local measures, general tonic hydrotherapy and the relief of any underlying pathological condition should be at once instituted. We may commence with the electric light bath to free perspiration, followed by the horizontal rain bath at a temperature of 104° F. for one minute, reduced to 80° F. for one-fourth minute, pressure twenty pounds. Give the treatment daily, decreasing the temperature two degrees until 65° F. is reached and increase the pressure one pound until thirty is registered. This may be followed by the use of the perineal douche at 60° to 50° F. for one-fourth to one-half minute, pressure bearable. Should any discharges from the uterus be present they are best met by the use of hot vaginal douches of bichloride (1:2000) or hot potassium permanganate (1:1000 or 1:500). The douche should be taken in the dorsal position in order that the rugæ may become distended and to prevent the secretion from reaching the vulva and external surfaces. Tampon the vagina with gauze wet in some alkaline antiseptic solution, on the top of which, at the entrance, place a plug of cotton. This dressing should remain in for twelve hours. Sometimes it is not the quantity but the acridity of the secretion that causes the trouble. The hot sitz bath at 105° to 110° F., duration ten minutes, is an excellent method of relieving intense irritation. Where this cannot be followed out the fomentation at 120° to 130° F. for five to ten minutes, repeated, will be found serviceable. The prolonged neutral sitz bath at 94° to 92° F. for twenty minutes will oftentimes give relief when all other measures fail. An excellent plan to pursue is the following: Morning and night, vaginal antiseptic douche, followed by the hot sitz and tampon; during the middle of the day general tonic hydrotherapy. Zinc stearate with ichthyol is an excellent dressing to be used in these cases.

Vaginismus and Vulvo-Vaginal Hyperesthesia.

These conditions are the same in origin and essential features. In vulvo-vaginal hyperesthesia there is extreme sensitiveness of the introitus vaginæ and contiguous parts, while in vaginismus there is superadded powerful contractions of the constrictor cuni muscles when the parts are touched. It occurs most frequently in young recently married women. These cases vary in intensity, and may form a barrier to or make sexual relations painful. It is a neurosis, usually dependent upon local conditions, but often having a constitutional background. Inflammation, cicatricial contraction, with or without erosions, are the most constant local causes. Many cases occur in neurotics. Rectal diseases, especially fissure or fistula, may cause it.

Treatment should be both general and local. The general treatment consists of the electric light bath, superheated dry hot air body apparatus or the hot-air bath to the point of free perspiration, unless the patient is thin and anemic, in which event it should be stopped just short of sensible moisture. This should be followed by the horizontal rain bath at 100° to 102° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure twenty pounds; reduce the temperature two degrees daily to 60° F. and increase the pressure one pound until thirty pounds is registered. This bath should be immediately followed by the hot sitz at 105° to 110° F., or even 115°, for fifteen minutes. Commence with 105 and rapidly add hot water until the highest possible temperature is reached. As soon as the patient can stand the treatment the jet douche should be instituted, and to this end we may give the following: Electric light bath to perspiration, followed by the horizontal rain bath at 100° F. for one minute, pressure twenty-five to thirty pounds; this in its turn to be followed by the jet douche to the spine at 110° to 120° F. if possible, pressure twenty-five pounds, reduced to 75° F., same pressure. Following this somewhat vigorous treatment we may select the application of the hot sitz or a very hot perineal douche for a half to one minute at the same temperatures.

The local treatment embraces the use of gradual dilatation, commencing digitally, until the smallest size of the self-retaining rectal dilators can be used. When this point is reached the patient is to be instructed to use the dilator for several hours daily. Constipation must be looked after and sexual abstinence insisted upon.

Vaginitis.

Vaginitis is an inflammation of the vagina, either acute or chronic. Its origin is most frequently microbic, but it may be caused by injury, acrid uterine discharges, strong chemicals, etc. The pavement epithelium of the vagina is hard, dense, resistant, and under ordinary circumstances a protective against germ infection, save to the gonococcus of Neisser, which is by far the most frequent provocative. This infection is more active where the epithelium has been previously macerated by leucorrheal discharges. Its pathology is essentially that of a surface inflammation, microbic in character.

The essential treatment in the management of this troublesome affection is to remove irritation, secure cleanliness, relieve congestion and secure rest. The first step should be the administration of a large dose of calomel, followed by a saline and hot enema next day. The bowel after this should be kept freely open. Give the hot vaginal douche with potassium permanganate (1:500) morning and night, with the patient in a dorsal position; administer three or four douches between times of hot normal saline solution, followed in each instance

by the hot sitz bath at 105° to 115° F. for ten to fifteen minutes. The usual result is a very prompt subsidence of the inflammation. When this has taken place a more or less chronic inflammation remains, which, in the author's experience, has proven rather tenacious. In order to bring about a cure the following method has been found most satisfactory: After securing complete functional rest of the parts, the uterus is treated for any existing disease and the patient given night and morning the hot vaginal douche, 105° to 115° F., in a dorsal position, followed by the hot sitz bath at 105° to 110° F. for ten minutes. With improvement this treatment becomes necessary but once daily. The vagina should be packed loosely with gauze wet with an alkaline antiseptic, and any abraded or ulcerated surfaces touched with carbolic acid (10 per cent.) or argyrol in glycerine (25 per cent.).

General tonic measures are necessary for the permanent restoration to health, and nothing equals the electric light bath to point of free perspiration, followed by the horizontal rain bath at 102° to 103° F. for one minute, reduced to 65° F., pressure twenty-five pounds, followed by a cold sitz bath at 60° F. for two to five minutes. Any existing complications should be met.

Amenorrhea.

Amenorrhea may be defined as an irregularly appearing, deficient or suppressed menstrual flow. This condition is by long odds most frequent in young girls just entering the stage of puberty or during their early womanhood. It may be stated as almost axiomatic that wherever we have this function affected general disturbed conditions are always associated with it which demand attention.

In girls who are frail and weak, who have impaired general health, and in whom the menstruations appear scanty, we may expect the varying disturbances associated with a partial or total disappearance of the flow; but in these cases we should be most particular and exhaustive in our examination of the general condition, for at this age tubercular trouble most frequently makes its appearance. Where tubercular conditions exist the failure of the menstrual flow is a valuable asset to the patient, for Nature, in her conservative and preservative ways, is husbanding all the strength, vitality and blood that the individual possesses to fight the disease.

The most frequently associated condition is probably anemia or chlorosis. The appearance of the girl or woman indicates or suggests the condition that is present, for the skin is likely to be of a pale sallow or grayish-green color, with a tendency toward scaliness, dryness and harshness. These girls are especially prone to develop a dry, harsh skin of the body and a greasy and pimply condition of the face, the acne being of the small pustular variety, with rather hard bases. Often we find the presence of a marked digestive disorder. No

doubt this is due to the fact that young people at the time of puberty pay very little attention to the proper and careful mastication of their food. Not only is it essential that food should be well subdivided by proper chewing, but that the saliva be carefully and thoroughly incorporated in the bolus before swallowing. Girls and boys gorge themselves with improper food, poorly masticated, and trust to the strength of youthful digestive organs to overcome their carelessness. It is not astonishing that these girls develop a sallow and disordered skin, and an over-abundance of "nerves." Overstudy and strain starve the generative organs both of nerve force and the circulation needed for their proper development and normal action. The large quantity of nerve force that is normally required for the sexual organs is denied them, wasted in studies that are often of no real practical value.

Studies should have for their object the training of the mind and not the mere acquirement of knowledge; a little study well applied to the development of brain capacity, without robbing any of the vital organs, is indeed a rarity. There is an intimate and close relation between the nervous system and relief to nerve tension in the normal performance of the menstrual function.

There is, however, another type—a girl in whom menorrhea may occur, she being to all appearance strong and robust, with fair or excellent development of hip and bust, and in these cases we may almost certainly count that the failure to properly perform this function is due to some nervous element. With the menses stopped they begin to worry, because they know something is wrong; this simply adds fuel to the flame, making matters worse and retarding recovery. A little persuasive psychology will often do as much toward relieving the primary causes as well-applied treatment.

Where the condition occurs in a female who has married we can look usually to one of two conditions. We will find that the flow is usually diminished or scanty, rather than that it is completely stopped. In the first class is the anemic, neurotic, overworked and toxic woman, in whom the conditions are similar to those enumerated above. The other type or class, however, is distinctive, and gives the history of having married and rapidly gained flesh—in fact, has become overly stout, although a test of the blood will show that she is a "fat anemic." They are usually sterile, have no children or work to engross their attention, lead an indolent, novel-reading life, and present the dull, listless "tired-all-the-time" woman. Local examination shows the cervix to be congested and the entire musculature and circulation of the pelvis to be weak.

The diagnosis is usually quite clear in married women where a full and thorough local examination can be made, and the conditions there found will clearly point out the line of treatment to be adopted.

When the girl is of sufficient age, though backward in development, is small in stature and thin, where the breasts are flat, the thighs small and the general contour indicative of improper filling, we may reasonably expect an infantile uterus and pelvic organs. This condition demands urgent and immediate attention, and no false modesty should prevent the physician from plainly laying before the family the prospect of imperfect growth and sterile womanhood, with accompanying unhappiness if the girl enters the marital state. Parents, as a rule, when this matter is properly and delicately broached, are willing that the examination be made, and, in my opinion, when once attempted, must be thorough and painstaking. We will, as a rule, find that the labia are narrow and thin, that the perineum and vagina are short, that the uterus is small, undeveloped or infantile in size, and the ovaries difficult to detect.

Hygienic rules should be instituted and the patient made to retire early, obtaining as much sleep as possible. It is preferable that the mattress be firm and the bolster or pillow not too high. She should learn to sleep upon the side, not upon the back or abdomen. Over-study is to be prevented, and recreation in the fresh air sought. Pleasant companions of her own age and sex aid in recovery. Society, parties, late hours and all forms of excitement are to be forbidden.

The diet should be plain, with a small amount of meat, plenty of milk, vegetables, butter, few sweets; no pickles, pastries or eating between meals.

Hydrotherapy is probably enough in itself to bring about restoration of health, owing to its tonic, stimulant, reconstructive and nerve-sedative properties. The patient must be gradually trained to stand cold water. We may commence with the electric light bath or hot-air bath to point of perspiration, and follow this, in very delicate cases, with the rapid cold sponge or the dripping sheet at 80° F. for three minutes, reduced two degrees daily to 65° F. This will gradually establish reaction, and we may then proceed to the electric light bath to free perspiration, followed by the horizontal rain bath at 100° to 102° F. for one minute, reduced to 65° F. for one-fourth minute, pressure twenty-five pounds. This may be followed by the very brief cold sitz bath (55° to 65° F.) for two or three minutes. The direct and reflex influence of this last procedure is to materially increase pelvic circulation. A most satisfactory application in cases that are fairly robust, and who have been trained to the treatment, is the application of the Scottish douche. Give the following: Electric light bath to free perspiration, followed by the Scottish jet douche to the spine at 105° to 110° F. for fifteen seconds, alternating with the cold jet at 70° to 50° F., applied to the lower spine, hypogastrium and inner surface of thighs, for ten seconds, pressure twenty pounds,

this treatment to be followed by the sitz bath above referred to. Endeavors should be made to relieve the anemia, chlorosis, digestive disturbances, constipation, malaria, etc. The author has demonstrated frequently the fact that Chapman's ice-bag or an ice-compress applied to the lower spine will have a most beneficial influence in heightening the pelvic circulation and bringing about an increased flow. The wet half pack or trunk compress applied to the pelvic region and hips at 60° F. for twenty minutes acts in a similar manner. Daily or twice daily use of the hot vaginal douche at 120° F., three to four quarts, will tend to improve the vascular activity of the organs. At the time of the menstrual flow endeavors must be made to concentrate the circulation within the pelvic organs, and to this end we employ a number of methods, the simplest of which is the vaginal douche at 100° to 102° F. night and morning, followed by the fomentation or hot pack to the pelvic region for twenty to thirty minutes, or the hot sitz bath or the hot half bath at 105° to 110° F. for ten to fifteen minutes. It should be borne in mind that very hot vaginal douches check the flow, while those at the temperature named tend to produce bleeding.

These cases are frequent, and can, in the vast majority of instances, be radically and certainly relieved by hydrotherapy, the simplicity of which places it within the range of every physician's practice. It is surprising that this method is so little utilized.

Dysmenorrhea.

Normal menstruation is unattended with pain or discomfort of any kind, and this is true of all the functions. During the process the mucous membrane lining the uterus shreds and disintegrates, and should be passed through the cervical canal without pain. Dysmenorrhea is difficult or painful menstruation, and is no longer considered a pathological entity, but a symptom secondary to other conditions, and this is true in practically every case. I know of no condition so often associated with other pelvic diseases as this. We have, as a rule, more than one disturbing element.

Dysmenorrhea may be classified under three heads:

1. A constitutional and neurotic class, having the origin of their pain outside of the pelvis and dependent upon general conditions. In this class we find the neurotic, neurasthenic, rheumatic, gouty, malarial, anemic and gastro-intestinal individual.

2. A secondary or inflammatory class, in which the pain originates and is secondary to other conditions in the pelvis, the principal cause of which is endometritis.

3. A stenotic or obstructive class, the pain of which, in my opinion, being due to an actual narrowing or obstruction of the canal. The majority of women who suffer from this trouble show depraved general health, although there are some who seem to be in "apparent (?)

health." Many of these women live in cities and follow luxurious and enervating lives.

There is another type of women, thin, anemic, the subject of gastro-intestinal disturbances, who, barring the inflammatory and steratic types, is distinctly predisposed to neurotic and constitutional disturbances, and in whom menstruation may become so painful as to undermine the general health; they do not recover from one period to another.

It may be stated that the younger the sufferer from dysmenorrhea the more defective is the development of the pelvic organs. Most females suffering from dysmenorrhea know of the approach of the menstrual epoch through certain signs, which may become noticeable from seven to ten days prior to the onset of the flow, the most common of which is an increased nervous irritability, together with an aching in the back or loins. At or about this time the breasts become tender, and a sensation of fullness is experienced in the pelvis.

Barring the truly organic and secondary inflammatory cases, I accept Massey's[1] explanation of the condition as an "almost entirely neuro-muscular phenomenon, the attempt at the performance of an important function, while either the nerve centers in the cord or the uterus itself are in an unprepared condition, resulting in pain. That the spasm alone is the parent of the pain, rather than retained secretion, is more than likely, as associated sequence being an inhibition of the secretory act until relaxation has occurred. The spasm, in brief, may be said to be a neuro-myotic storm of the uterine neuro-muscular apparatus which renders the secretion of the menstrual fluid temporarily impossible. That a spastic muscular contraction, most noticeable at the internal os, usually accompanies dysmenorrhea is undoubted, and there is reason to believe that the contraction may be excited by the sound between periods."

Sexual influences often play a most important part in the cause of this condition by influencing pelvic congestion. Strong sexual desires, under forced abstinence, may act as a direct cause. Sudden cessation of sexual activity in young widows is productive of dysmenorrhea and many neurotic manifestations of a hysteroid character. Imperfect or unsatisfactory intercourse may likewise prove a source of irritation and the beginning of disorders about or during the menstrual period. This is a most delicate point, and is often not revealed until sought for, because of a feeling of modesty and a general disinclination to discuss sexual life with even a trusted medical adviser. Such conditions, if suspected, must be sought for and corrected, if possible. The deteriorating influences following onanism and excessive venery influence the organs directly by their congestive effects,

[1] Massey, G. Barton, "Conservative Gynecology and Electrotherapeutics," 1903, p. 88.

and indirectly, acting through the sympathetic and central nervous systems. Here tact and diplomacy are at a distinct premium.

The neurotic and constitutional type of dysmenorrhea fails to reveal itself upon the most careful examination for local disease or disorders, unless possibly we may consider a tender ovary significant. It is in these cases that the pain usually precedes the flow for several days, and the patient becomes, as it were, primed up for the period: becomes nervous, sleepless, has headache, dull, heavy backache, depression of spirits, pains in the hips and thighs, tender breasts, and even sensitive throat. The pain is usually greatest during the first day, is periodic in duration and of a cramping character. Local examination at this time presents nothing expulsive in type, the flow being steady and regular. Likewise between periods, the physical examination of the patient shows no inflammation or obstruction, no endometritis, no leucorrhea, no intermenstrual pain, no periuterine inflammation. Neurotic and neurasthenic conditions, with depreciated nerve force, sluggish circulation and cold extremities are usually present.

In girls and women who are impressionable and overwrought during the period, we may look for and expect hysterical crises and an aggravation of all the bodily states, the return of headaches, neuralgia and other nervous manifestations. We are, therefore, compelled to conclude that the attack is the expression of a neuro-muscular storm, the result of a general neurotic or hypersensitive nervous system. It is for this reason in these cases, and in virgins, that endeavor should be first made to secure relief by general measures, to be outlined, and such external or cutaneous applications as are recommended. If these measures fail, a local examination must be made and local treatment instituted.

In the inflammatory type of dysmenorrhea menstruation is likewise accompanied by severe pain; the pulse may be full and rapid, the skin hot and dry, with headache, backache and pains in the lower limbs. They are much affected by chronic constipation, and, in my experience, have been singularly disposed to hemorrhoids. Women in this condition are very sensitive to exposure to cold and moisture, and yet they will take great risks of getting their feet wet, or will sit on cold stone steps, wear low-cut shoes and thin open-work stockings, and wonder why their medical adviser cannot prevent or immediately relieve their condition. Where the dysmenorrhea is due to the remains of inflammatory conditions of the uterus or peritoneum, which binds down this organ and by preventing its physiological increase in volume during the menses interferes with its return circulation, this must be taken into consideration. Prolapsed ovary is not an unusual accompaniment of this condition.

By stenotic or obstructive dysmenorrhea I mean those cases in

which examination reveals an actual narrowing of the canal, the condition known as "pin-hole os," where a small probe will not pass without exquisite tenderness and obstruction. It must be remembered that what is obstructive between times must be doubly so at the time of the period, when the mucous membrane is extensively congested. Care must be exercised in examining these cases not to use force; handle your probe as you would a pen, not a leather punch. It may be stated as axiomatic that obstruction causes inflammation, and that the essential element is free drainage.

Hygienic rules of health, with moderate restrictive exercise in the open air, and a diet in which butter, bread, milk, fruits and vegetables form a large portion, is essential. Constipation is to be carefully corrected, and the use of morphine and other narcotics avoided. The clothing should be loose and in nowise interfere with the circulation, and for this reason a corset that constricts the waist may possibly prevent cure by congesting the pelvic organs and preventing return circulation. Good shoes with thick soles, low heels, and stockings of sufficient thickness must be worn.

Hydrotherapy presents one of the most efficient therapeutic weapons, both palliative and curative, at the command of the physician, for it is an eliminant, tonic and sedative, and its use is, as a rule, followed by an increase in flesh, blood and relief of pain. Between the periods we should always employ tonic hydrotherapy, and this can be administered in any home. The best method, however, to handle these cases is that of institutional treatment, which should commence with the electric light bath or the hot-air bath until moderate perspiration is produced, followed by the horizontal rain bath at 100° to 102° F. for one or two minutes, reduced to 80° F. for one-fourth minute, pressure twenty-five pounds. Decrease the temperature two degrees daily to 65° F., at which time we may add to the above treatment the jet douche at a temperature of 60° to 65° for five to ten seconds, applied to the lower half of the spine, moderate pressure of twenty-five pounds, finishing the treatment with its application to the hypogastrium and inner surface of the thighs. This is an especially valuable treatment if, in addition to the dysmenorrhea, we have a scanty flow.

Continental authorities are very fond of the brief cold sitz bath at 55° to 65° F., for two to five minutes. Some authorities advise the perineal douche at 55° to 60° F. for one to two minutes, strong pressure; but the author's experience has been that these applications find their greatest value in those conditions in which the organs are in an infantile or semi-infantile state. It is an excellent plan of treatment to administer in the morning a hot saline vaginal douche, three to four quarts, temperature 110° to 115° F., and during the day give the tonic hydrotherapy above mentioned. Endeavor should also be

made to relieve anemia, chlorosis, malaria, neurasthenia, hysteria, local obstructive conditions, inflammation, etc. During the menstrual period rest in bed is enjoined, and hot applications made to the pelvic viscera. Of these there are many, the simplest of which is the fomentation at 120° to 130° F. applied to the hypogastrium for ten minutes. The hot wet pack, hot trunk compress to the pelvis and hips at 115° to 120° F. for twenty to thirty minutes, in connection with the use of the vaginal douche at 102° to 105° F., or rectal enema at 100° to 105° F., will oftentimes bring about the period with freedom from pain. Probably the most satisfactory method, however, is the hot sitz bath at 105° to 110° F. for five to ten minutes; or the hot half or the hot full bath at 104° to 110° F. for fifteen minutes, either of which is to be followed by the vaginal douche at a temperature of 102° to 105° F. If the flow is scanty the two last-mentioned baths should be given for ten to fifteen minutes; if profuse, four to five minutes. These baths may be administered twice daily, morning and night. Hot drinks of all kinds and the hot-water bag will be found useful between times. If leucorrhea is present antiseptics and astringents should be added to the douche. It is astonishing to note how many cases of dysmenorrhea will be relieved by these general and local hydriatic treatments.

Endometritis; Metritis.

Endometritis is an inflammation of the mucous membrane, and involving to a greater or less extent the parenchyma of the uterus. The mucous membrane of the uterus is not analogous to other mucous membranes which are in daily or hourly activity, the function of the uterus in reproduction being called into exercise only occasionally; menstruation, while connected with reproduction, is not necessary to life.

Predisposing factors are of great importance, and are found in all those variations from what we call "good general health." It may originate from anemia and chlorosis, rheumatism, gout, tuberculosis in all forms, the exanthemata, typhoid, influenza; from the present baneful methods of schooling; laborious occupations; obstinate constipation; exposure to damp cold, especially wet skirts, shoes and stockings.

Excessive exercise, over-exertion, straining, lifting, blows upon the abdomen, excessive dancing, long-continued standing upon the feet during the menstrual period, excessive coitus and onanism keep the uterus congested and favor endometritis.

Local causes aid through circulatory disorders and bacterial infection. Care should be exercised during the puerperal state to avoid infection from unclean hands or instruments, irritating tampons and the application of strong medicines. Where true stenosis exists, pre-

venting drainage, where there are retained secundines, and where there is acute vaginitis, we may expect an uterine inflammation to follow.

Infection by micro-organisms is the usual rule, the most common being the staphylococci pyogenes aureus et albus, streptococci, and the micrococcus of Neisser, which latter occurs usually in 35 to 40 per cent. of all cases. A patient suffering from acute endometritis is usually in bed, complaining of pain, weight and dragging sensation in the pelvis, together with considerable rectal and vesical tenesmus. The pain is most intense just above the pubes, and radiates into the groin and thighs. There is a dull, heavy soreness over the sacro-iliac region; the bladder is usually irritable and frequently emptied. The uterine mucous membrane becomes red, swollen, edematous, softened, bleeding easily, a discharge of mucus or muco-pus being usually present.

The existence of an acute purulent inflammation within the uterine cavity renders complications an easy matter, extension of the inflammation occurring by continuity of tissue. Acute endometritis does not, as a rule, cause death, and where ordinary care and attention are given by the patient to the treatment of the disease, and where the medical adviser is in charge, the outcome, *so far as the acute attack is concerned*, is generally favorable.

The patient is put to bed and kept at perfect rest, a daily or twice daily hot saline enema administered, together with hourly drachm doses of Epsom, Rochelle or Crab Orchard salts to the point of free catharsis. The enema should be followed, especially if the inflammation is due to a suppression of the menses, by the use of the hot trunk pack, the trunk compress or the pelvic pack at 120° to 140° F. for one hour; or the fomentation at 130° to 160° F. for ten minutes, repeated for ten minutes; or the hot sitz bath or the hot full bath at 105° to 110° F.—115° F. if possible—with the water well over the hips, for ten to twenty minutes. Commence with a lower temperature and rapidly add hot water until the highest possible temperature is reached. The patient is then removed to bed, first a hot antiseptic saline vaginal douche given, then wrapped in a hot dry pack, with a hot-water bag to the pelvic region and another to the feet. Hot drinks to promote diaphoresis may be administered. Any of the above treatments may be given twice daily, in the morning and evening. The diet should be exceedingly simple, *usually liquid, free from meat* and meat soups, and to consist preferably of milk, Vichy water and prepared infants' foods. During the attack or convalescence, in addition to the foregoing measures, we may employ the cold sponge at 75° to 50° F. once or twice daily, in order to energize the nerves and vital forces. As soon as the patient is able to stand upon her feet, the dripping sheet at the same temperature, with vigorous

friction, avoiding, however, the lower abdominal and pelvic regions, may be employed. Its duration should range from two to five minutes daily; reduce two degrees with each application until the lower temperature is reached. As the patient begins to walk around, the warm full bath at 100° F. for five minutes, followed by the salt rub and cold shower at 65° to 50° F. for ten to fifteen seconds, will be found an excellent measure.

Such vigorous treatment usually results in a very prompt subsidence of the acute attack, which may or may not be followed by a subacute or chronic condition. The administration of a high-tension vaginal bipolar faradic treatment will subdue pain. As soon as there is a complete subsidence of the acute inflammation we may follow the plan outlined for chronic endometritis.

Chronic Endometritis; Metritis.

I still adhere to the time-honored belief that we have here to deal with a chronic inflammation of the endometrium, which may or may not involve the parenchyma of the uterus. Peterson has simply and clearly called attention to the symptoms of this disease, which is manifested by a syndrome consisting of pain, local, transferred or reflex; leucorrhea, dysmenorrhea, uterine hemorrhage, with symptoms in neighboring and distant organs.

Chronic endometritis may follow an acute attack, may develop from malposition of the uterus, from laceration, syphilis, gonorrhea, or from microbic infections. There is usually dull pain in the thighs and back, together with uterine hemorrhage or blood-streaked discharges. The bladder is usually involved, frequent desire to evacuate being present.

Certain general facts should always be borne in mind in the treatment of chronic endometritis, it being axiomatic that the better the general health of the patient the quicker will the endometritis improve. For this reason we should search diligently for those variations in nutrition and elimination that are oftentimes associated with the local inflammation. Especial search should be made for anemia, chlorosis, neurasthenia, digestive disorders and constipation. Where possible, eliminate worry and care. The local treatment must always be considered in the light of existing complications.

The diet should be mixed, nourishing, and from which all rich, highly seasoned, spiced and indigestible foods have been removed. Any digestive disturbance must be given attention. Gentle and moderate exercise, together with certain gymnastics, deep breathing, erect and in the genu-pectoral position, will materially aid in exercising the muscular pelvic floor, as well as the abdominal and perineal muscles. In some cases massage, local and general, is of value. The dress should be free from waist constrictions, especially where there is

a tendency toward impediment of the return circulation from the pelvis. The clothing must be light, with the major portion of the weight carried by the shoulders. In women who are naturally slim and who have never had recourse to tight lacing, a snug-fitting waist may be allowed.

The home treatment of such cases should commence with the cold sponge at 70° F., rapidly performed, the temperature being reduced two degrees daily to 50°. At this point the warm full bath at 100° to 102° F. for five minutes may be followed by the sponge as above. When the patient begins to react, continue the warm full bath at 102° F. for five minutes, and while the patient stands in the tub give a rapid salt rub, followed by the cold shower at 65° to 55° F. for ten to fifteen seconds. This will be found a very valuable measure for home treatment. Where the shower cannot be obtained the warm full bath and salt rub may be employed, followed by an affusion to the chest and back at 65° to 60° F. The general sanatorial management of the case commences with the administration of any of the above methods, or the electric light bath to the point of perspiration, followed by the rain bath at 103° to 102° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure twenty pounds; reduce the temperature two degrees daily to 60° F., and increase the pressure one pound daily until thirty is registered.

Where we have to deal with women who are the possessors of a fair degree of flesh and fat, we may change the above at the end of a week to the following treatment, provided their reaction has become well established: Electric light bath to the point of free perspiration, followed by the horizontal rain bath at a temperature of 102° to 104° F. for one and one-half minutes, followed in its turn by the jet douche to the spine and posterior aspect of the lower limbs at 65° F. for ten to twenty seconds, pressure twenty to thirty pounds.

The local management demands the daily or twice daily use of the vaginal douche, using a hot normal saline solution at 115° to 140° F., three to four quarts.

When leucorrhœa is present, especially where it is due to micro-organisms, we may employ the douche of normal saline solution or one containing antiseptics and astringents, among which may be mentioned hot permanganate of potassium (1:500 to 1:1000) or hydrargyrum bichloride (1:3000 to 1:5000). Where much pain is present we can use the prolonged neutral sitz bath at 95° to 97° F. for fifteen to thirty minutes once or twice daily, or the very hot sitz or half bath as hot as can be borne; where these baths cannot be administered employ the pelvic pack or trunk pack at 130° to 140° F. for thirty minutes. At the menstrual period, if much pain and diminished flow are present, the hot sitz bath at 105° to 110° F. for ten to fifteen minutes, followed by a vaginal douche at 100° to 102° F.,

usually brings about relief of pain and starts bleeding. Where these measures are not at hand we may use the very hot compress, the fomentation, or pelvic pack, at 130° to 150° F., applied to the pelvic region for ten minutes, repeated for ten minutes, the treatment to be given twice daily.

The hot springs of Arkansas and Virginia, the Pagosa of Colorado, the Las Vegas and Ojo Caliente of New Mexico, have gained some little reputation from their use of the hot full and hot sitz bath in conjunction with the internal use of the waters.

Uterine Displacements.

The influence that hydrotherapy exerts is a secondary one to the mechanical and surgical management. Its action is limited to the general tonic up-building that results from its general use, though it must be said that in many cases this, in connection with the use of local electrical and mechanical treatment, frequently results in such an improvement of the states of the uterus that functional cure is brought about, for it is an interesting fact that after such a course of treatment women remain in excellent health, in spite of the fact that their uteri are not *a la mode*, or according to text-book cuts. To this end we may use the electric light bath to the point of free perspiration, followed by the horizontal rain bath at 102° F. for one minute, reduced to 80° F. for one-fourth minute, pressure twenty to thirty pounds. Reduce the temperature two degrees daily to 65° or 60° F. This should be immediately followed by the cold sitz bath at 65° to 60° F. for two to five minutes, accompanied by friction applied to the abdominal wall and internal and external surfaces of the thighs by the patient, while the nurse also applies friction over the lower spinal region and the buttocks.

Hydrotherapy's principal value lies in its powerful influence in building up the general health, improving circulation, bettering digestion and assimilation, relieving inflammation, congestion and stasis, increasing elimination, and in this way placing the patient in a state of general good health. By relieving accompanying conditions local electrical and mechanical treatment may bring about functional cure. If it is impossible to carry out the treatment as above outlined in some hydriatic institution we may have recourse to the following "home" methods: Commence with the dripping sheet at 80° F. for three minutes, with vigorous friction, the temperature of which is reduced two degrees daily to 60° and even 50° F.; or the full wet pack, starting at a temperature of 80° F. for thirty minutes, reduced five degrees to 60° F. and increased five minutes daily until a duration of one hour is attained. Both of these should be followed by the use of the cold sitz bath at 65° to 60° F. for two to five minutes, with friction as above described. This treatment can be given in any home, and

will oftentimes be sufficient for restoration and cure, in conjunction with the use of electricity, massage and glycerine tampons.

Uterine Hemorrhage; Menorrhagia and Metrorrhagia.

Menorrhagia is an excessive flow of blood at the menstrual period; metrorrhagia is a hemorrhage from the uterus independent of the period; both constitute forms of the generic term, uterine hemorrhage. The older terms are retained, but the difference between the two and the line separating them is a fanciful one of theory rather than reality. The blood sometimes lost during a year is remarkable. The trouble may arise from general conditions—hemophilia, scurvy, anemia, chlorosis, malaria, syphilis, tuberculosis (incipient), septic infections, general debility, cardiac disease, diseases of the liver, spleen, kidneys, nervous and mental conditions, hysteria, fright, change of climate, etc. Local causes are uterine, tubal or ovarian in character, such as displacements, malignant disease, tumors, lacerations, chronic inflammations, and any cause obstructing the return of blood from the pelvis. These conditions must be met in the management of the case, and the reader is referred to the particular section for information.

General measures to be suggested in connection with these cases are rest in bed, nutritious diet, laxatives, attention to digestion and abdominal support. General conditions are best met by general measures, but the following may be used, combining as it does general and local therapy: Electric light bath to free perspiration, followed by the horizontal rain bath at 102° F. for one minute, pressure twenty-five pounds, reduced to 80° F. for one-fourth minute. Reduce two degrees daily to 65° F., and follow by a moderately prolonged sitz bath at 65° to 50° F. for five to fifteen minutes, accompanied by friction to the abdominal wall and inner and external surfaces of the thighs, while at the same time a hot foot-bath at 110° to 115° F. is administered. In case the electric light and rain baths cannot be given the sitz bath may be preceded by the use of the dripping sheet, commencing at a temperature of 80° F., duration three minutes, accompanied by vigorous friction. Make the sheet a little wetter from day to day and decrease the temperature two degrees until 60° to 50° F. is reached. The sitz is used immediately after this. The author has seen excellent results in uterine hemorrhage arise from the use of Chapman's double-column spinal hot-water bag applied over the lumbo-sacral region at a temperature of 115° to 120° F. for twenty to sixty minutes, repeated as needed. Attention should be paid to the fact that the action of the prolonged cold sitz bath, accompanied by friction, is to cause profound and extensive contraction of the internal pelvic and abdominal blood-vessels.

In the local management of these cases the very hot vaginal douche at 110° to 120° F., one to two gallons normal saline solution, followed

by the cold trunk compress, cold pelvic pack, or the half wet pack applied to the hypogastrium and inner thighs, accompanied by the hot foot-bath at 110° to 120° F., with a duration of twenty to thirty minutes, oftentimes checks the hemorrhage when many other things fail. Winternitz has suggested in extreme cases the use of cold water in a vaginal douche, but of this the author has no experience, as he has been able to control the hemorrhage by the measures above suggested. These are cases that distinctly require more or less prolonged cold applications, in which *prolonged hot* to warm douches, sitz and foot-baths, fomentations and compresses are contraindicated, as are also short very cold applications to the lower spine, abdomen, thighs or feet, as they increase internal pelvic circulation.

Abortion.

Abortion is the expulsion of the product of conception of pregnancy, alive or dead, before the period of viability, now considered the sixth month. It may be brought about by conditions of the maternal general health and local conditions in the uterus, from paternal causes (advanced age, lowered vitality, syphilis, alcoholism and tuberculosis), from degenerations in the fetal membranes, or with criminal intent. Its dangers are hemorrhage and infection. Some women habitually abort as the result of syphilis, lead, tobacco poisoning and heart disease. Local causes exist in malformations, displacements, etc.

The first thing to be done is to curette the uterus, by means of which septic matter is removed, and after this asepsis must be maintained. Positive rest is essential, and three or four times daily the vaginal douche of hot saline or antiseptic solution should be administered. Where the condition is habitual causative factors must be sought for and treated, and as far as possible the general health built up by tonic hydrotherapy. Weber says that those women who habitually abort because of cardiac disease may frequently be brought to full term by the use of the Nauheim or CO_2 baths, and, further, that these baths have a tendency to prevent the condition where other causes are at fault. Following miscarriage the woman's health is apt to deteriorate, and the sooner she can be placed in good general health the better for her. Commence with the cold sponge at 85° F. once or twice daily, followed by friction with a crash towel, *avoiding the lower abdominal wall*; reduce the temperature two degrees daily until 60° F. is reached, at which time we may institute the dripping sheet at 60° F. for three minutes, preferably given before breakfast. Where institutional treatment can be obtained she should be placed upon the electric light bath to free perspiration, followed by the horizontal rain bath at 100° to 104° F. for one to two minutes, reduced to 60° F. for one-fourth minute, pressure twenty-five to thirty pounds. Where sub-

involution exists this treatment may be followed by the use of the cold sitz bath at 50° to 60° F. for two to five minutes, accompanied by vigorous friction on the part of the patient to the lower abdominal wall and the inner side of the thighs, and by the nurse to the lower back and buttocks.

Eclampsia.

Puerperal convulsions is a symptomatic disorder characterized by convulsive seizures coming on suddenly prior to, during or after labor. Prevention is easy for him who watches the urine for the amount of urea excreted, albumin, casts, etc. If necessary abortion must be induced.

Post-partum eclampsia, with its wide-open eyes, fixed stare, contracted pupils, rapidly closing and opening lids, clonic convulsions, irregular heart action, stertorous breathing, is characteristic when taken in conjunction with the clinical history. Seizures vary in number. Nature frequently produces spontaneous abortion. Its pathology is that of toxemia, probably due to the products of tissue metabolism, a condition that is present in a mild form in every case of pregnancy. This poison seems to not be uniform, more virulent in primipare and remaining inactive so long as the kidney is sufficiently intact. Of late years the mortality has decreased.

Should the convulsions be imminent or have commenced, treatment is the same. No solid food is given the patient at all, the only nourishment being iced milk, with the ingestion of water at short intervals where this is possible. Free catharsis is demanded and one drachm of Epsom or Crab Orchard salts in six or eight ounces of water may be taken every hour until complete liquefaction of the bowel movements takes place. Give hot enemata of normal saline every three or four hours, regardless of intestinal activity. Hypodermoclysis of one to two or more pints of normal saline or Jardine's solution (potassium bicarbonate and sodium carbonate, drachm one to a pint) should be introduced at the edge of the breasts or into the abdomen after delivery. It at once promotes diuresis and diaphoresis, and this may be kept up and elimination favored by the following: Hot full bath at 104° to 106° F. for ten to thirty minutes, repeated every two to three hours. The duration of this bath may be increased each time it is given five to ten minutes until a duration of thirty minutes is secured. It should be followed by the hot full dry pack for one hour. Some authorities have found that continuous irrigation of the rectum with a normal saline solution at 115° F. is a very effective measure. The treatment above suggested does not in any sense interfere with the usual medicinal measures.

Salpingitis.

Salpingitis is an inflammation of the Fallopian tubes, is of frequent occurrence, and, because of its tenacity, the serious organic and functional changes that follow, is productive of much invalidism in the female. It originates most frequently from the uterus by continuity of tissue, the inflammation traveling unobstructed into the tube. It is almost without exception infectious and of microbic origin, the most common germs being the streptococcus and gonococcus. The former gains entrance from unclean hands, instruments, from puerperal state, etc., through the lymphatics into the deeper structures, rising to the epithelial surfaces, causing a rapid and prompt invasion, ushered in by chill, high temperature, increase in pulse-rate and adynamia. The gonococcus, a frequent cause, gains entrance from the uterus and travels along the surface of the epithelial coverings of the tube bringing about desquamation of the surface cells. It is found in about 20 per cent. of the cases in which it is the cause, but this does not invalidate the remaining 80 per cent. of cases, as it is a short-lived germ, that perishes easily, although in certain localities, such as the vulvo-vaginal glands, it exists indefinitely. It thrives in the urethra, cervical canal and uterus; is short-lived in the tubes. Other germs produce salpingitis. Salpingitis may be catarrhal or interstitial, the former superficial in character, the latter involving the parenchyma. Recovery taking place, we may have a low-grade inflammation, with overgrowth of connective tissue lasting for years, converting the tube into a dense fibrous structure. Localized peritonitis from the passage to the peritoneum may result in an exudate and walling off of the tube. The tube may become distended, forming pyosalpinx (pus), hydrosalpinx (water), or hematosalpinx (blood). The tube may become enlarged, infiltrated and distorted. The septic material may escape and result in a matting together of all neighboring organs by adhesions. Salpingitis is frequently the cause of sterility, by occluding the tube or rendering the passage of the ovule so slow as to enfeeble it and prevent fecundation. Usually pain, tenderness, uterine hemorrhage and physical symptoms are present. A tube once the subject of salpingitis can, through a very slight indiscretion, again become the seat of a fresh attack.

In the acute stage the important point should be to control the inflammation, limit exudation and prevent the spread of infectious material. This can only be obtained by absolute rest in bed, with a nurse in attendance, and the use of the bed-pan for the bowel and kidney. Free catharsis must at once be secured, and to this end give Epsom, Rochelle and Crab Orchard salts, drachms one in eight to twelve ounces of water, every hour. As a result of free catharsis the bowel will be unloaded, fluid withdrawn from the pelvis,

its tissues depleted, absorption stimulated, pain and suffering relieved. Enemata of normal saline are to be used twice daily, regardless of bowel movements. The diet must be liquid and the patient urged to drink large quantities of water. The vaginal douche at 110° to 115° F. of normal saline solution, twice daily, will remove the acrid, foul-smelling, abundant discharges. If the infection is gonorrheal, antiseptics are added to the douche. It should be followed immediately by the fomentation at 130° to 160° F. for ten minutes, repeated for ten minutes, during which time the feet are immersed in a foot-bath as hot as can be borne. This treatment is repeated every two to four hours, and in the interval the ice-bag is applied over the inflamed tube.

In subacute attacks, the prolonged vaginal douche at 110° to 115° F., two to three gallons, lasting at least fifteen minutes, will be found an excellent measure. The prolongation of the hot water decreases the quantity of blood, astringes the tissues, lessens the caliber of the blood-vessels and checks inflammation; it may be used one to three times daily. Fresh air, moderate exercise, nutritious diet, regular habits and sexual rest are essential. Should pyosalpinx develop the case becomes surgical, and if necessary an operation must be performed. By means of hydrotherapy we may limit the ravages of the disease in scope, intensity and structural changes. Some cases will be unchecked; these are comparatively few. Many will recover entirely and others be so improved as to escape the necessity of an operation.

Chronic cases are benefited by rest, retiring early, sleeping late and spending part of the day in a recumbent position. In the home management we may institute upon arising in the morning the dripping sheet at 60° F. for three minutes, accompanied by vigorous friction, avoiding the lower abdominal region; or the full hot bath at 102° to 104° F. for five minutes, followed by the cold shower at 80° F. for one-fourth minute; reduce two degrees daily to 60° F. Where this cannot be carried out we may try the method of Kellogg[2], which the author can recommend: Hot pack to the pelvis and thighs for thirty minutes, followed by the stimulating trunk compress or wet half pack at 65° F. for three hours, or until the next hot pack is applied; in addition, the hot saline enema and vaginal douche, once daily, as well as an occasional dose of saline. In the institutional management the author prefers the electric light bath or the superheated dry hot air body apparatus, preferably the latter, to free perspiration, twenty to forty minutes, followed by the horizontal rain bath at 75° F. for one-half minute. Sunshine, moderate exercise, nutritious diet and tonics are indicated.

2 Kellogg, J. H.: "Rational Hydrotherapy," 1901.

Acute Oophoritis.

Acute oöphoritis is an acute inflammation of the ovary. The most frequent origin of the disease is streptococcus infection from a purulent salpingitis, although infection may reach the ovaries by the lymphatics from the uterus itself. Trauma, mechanical irritation, prolonged congestion, sudden suppression of the menses and the eruptive fevers are occasionally accompanied by ovarian inflammation. Puerperal sepsis is a frequent cause. The gonococcus, the colon bacillus (when the ovary is adherent to the rectum) and the pneumococcus may cause the trouble. The ovary becomes swollen, edematous and infiltrated, its surface covered with lymph, which later forms adhesions with the adjacent organs. Milder forms subside without pus formation; others show small foci of pus scattered through the stroma; in others an abscess results. Many become the seat of chronic inflammation. Ovarian abscesses may rupture; usually the condition results in the pus becoming sterile or converted into a cheesy mass. Some inflammations run their course with little apparent danger to the ovary. The onset is generally by chill, fever, nausea, vomiting, tenderness and pain, greatest over the site of the ovary. Physical examination usually shows the ovary to be enlarged, tender and prolapsed behind the uterus.

The aim should be to restrict the inflammation and limit its after-effects, and to this end absolute rest in bed and the use of the bed-pan for the calls of Nature are essential. Epsom or Crab Orchard salts in drachm doses, dissolved in eight to twelve ounces of water, every hour until free purgation takes place; the use of a hot enema of normal saline solution three times daily; and a vaginal douche at 130° to 120° F., using two gallons of normal saline, repeating every six to eight hours. Every three hours fomentations should be applied to the pelvis at a temperature of 130° to 160° F. for ten minutes, repeated for ten minutes and followed by the ice-bag over the ovary involved. Where both are involved, the ice-bag should be of sufficient size to cover the entire area. It is important to keep the hot-water bag constantly to the feet. The diet is liquid, and nothing is better than iced milk or iced carbonated milk. Free water-drinking is to be enjoined, meats, soups and alcohol avoided. As soon as possible the cold sponge may be commenced for its tonic and reconstructive properties. Start with a temperature of 90° F. and rapidly reduce the temperature two to three degrees each sponging until 60° F. is reached, at which it may be maintained. If the fever rises above 103° F. the temperature of the sponge may be made constantly colder—50° to 40° F. If pus forms abdominal section should be performed with every safeguard, owing to the well-known deadly rancor of ovarian pus.

Chronic Oophoritis.

Chronic oöphoritis is a chronic inflammation of the ovary, having its origin from a variety of causes. It is more common than the acute, and occurs most frequently during the child-bearing period of life. It may be a sequela of an acute inflammation, from a gonorrheal endometritis, from syphilis, from congestive conditions due to defective circulation, such as displacements; from masturbation, excessive sexual intercourse, unsatisfied sexual desires, excessive alcohol, tumors, sterility and celibacy. Congestion of the ovary is common in young girls at puberty, who devote little time to their physique and much time to studies. The ovary is enlarged, frequently studded with small cysts, or becomes the subject of interstitial inflammation, cirrhotic, atrophic and buried in dense adhesions. It is frequently associated with endometritis, salpingitis, pelvic tumors, etc. More or less continual pain and tenderness are present, especially on pressure, during exercise, standing, defecation and coition. Menorrhagia may be present, as are many digestive, nervous and some mental symptoms.

Rest is a feature in the chronic state, and to this end the patient should secure plenty of sleep at night and a nap during the day. Absolute rest on the flat of the back during the menstrual period must be enjoined. Separate beds should be occupied at night and coitus forbidden. Light clothing, suspended from the shoulders, without constriction at the waist, and a snug, tight and closely fitting abdominal bandage worn. Good, plain, simple but nutritious diet, drinking of pure water, moderate exercise in the open air and sunshine and frequent deep breathing exercises. The abdominal exercises, standing and in the knee-chest position will sometimes be found valuable. Laxatives may be given nightly and a saline once weekly. Tonics are always in order. Reconstructive measures should be instituted, and to this end we may employ in the home the cold sponge or the dripping sheet at 60° F. for three minutes, applied on arising, together with the use of the hot full bath at 100° to 105° F. three times weekly at bedtime. In conjunction with this treatment use the vaginal douche of normal saline solution at 110° to 115° F. night and morning, or once daily, followed by a tampon of ichthyol or charcoal in glycerine, 25 per cent. These cases are frequently helped by the use of the Turkish bath, but it should be cautiously given under a physician's direction. By far the best measure is the daily use of the superheated dry hot air body apparatus for thirty to sixty minutes, followed by the horizontal rain bath at 75° F. for fifteen to twenty seconds, to be immediately followed by the cold sitz bath at 60° to 50° F. for two to five minutes, accompanied by friction, to the lower abdomen, inner surfaces of the thighs and lower back. It should be here noted that after the use of the dry hot air, no warm water is given in the rain bath. Depending

upon the case, we may, if we so desire, in place of the sitz use the jet douche at 60° F. to the lower spine and posterior aspect of the lower limbs for ten to fifteen seconds. The electric light bath may be substituted for the dry hot air, but the author's preference is for the former. Some writers have found the neutral bath for twenty to forty minutes, three times weekly, an excellent measure, but it has failed to give good results in the author's experience. Far better than the neutral bath, where institutional treatment cannot be carried out, is the wet half pack, pelvic pack or the trunk compress at 60° F. for thirty to sixty minutes, preferably at bedtime.

Pelvic Cellulitis and Pelvic Peritonitis.

Pelvic cellulitis is an inflammation of the cellular tissue of the pelvis lying behind, in front of, at the sides of the uterus, and extending up between the layers of serous membrane which forms the broad ligaments. Pelvic peritonitis is an inflammation of the peritoneum surrounding the uterus and appendages. These conditions are frequently associated together or complicate each other. Cellulitis is an important factor in inflammatory lesions of the pelvis. Its cause is usually streptococci and staphylococci, more commonly the former. It is frequently associated with the puerperal state, and may follow labor at term or after an abortion. Many of those cases that present violent hypogastric pain, tenderness and vomiting after "catching cold" just about the menstrual period are doubtless cellulitis or peritonitis. Invasion is usually by the lymphatics along the layers of connective tissue or fascia of the pelvis. As a result we do not have uniform, but irregular strata. Entrance is usually gained through a laceration or abrasion in the genital tract or from some placental débris in the uterine cavity. The greatest number of cases follow the folds of the broad ligaments. The exudate, while soft and spongy at the start, soon assumes its characteristic "boardiness" or stony hardness and immobility. There is a tendency to suppuration, and pus, in seeking an exit, may cause fistulæ. This is a congenial soil for pus bacteria. It ordinarily runs its course in two to fourteen weeks. Pelvic peritonitis and pelvic abscess frequently complicate. If an abscess forms surgery is the only relief. It is manifested by pain, tenderness, tympanites, temperature, nausea, vomiting and anxious facies.

The importance of avoiding inflammation of the cellular tissue and peritoneum cannot be too much emphasized; this involves surgical and post-partum cleanliness. Women should seek to maintain good general health, avoid exposure both before and after menstruation, damp and wet feet in cold wet weather, and provide themselves with sufficient clothing, especially warm stockings and thick low-heeled shoes. Once cellulitis and peritonitis have commenced absolute perfect quiet and rest must be observed. This means rest

in bed with the hips elevated, a trained nurse in attendance, and attendance to the calls of nature by the bed-pan. The diet should be liquid and salines given in one drachm doses hourly until free purgation. This should be maintained, and in addition a hot normal saline enema given once or twice daily. In order to heighten the general resistive powers of the body in its fight against the infection, the cold sponge may be administered at 75° to 65° F. once or twice daily. Local treatment is of decided value, and embraces the use of the hot normal saline vaginal douche at 110° to 120° F., one to two gallons in quantity, three to four times daily, to be immediately followed by the application of the fomentation at 130° to 160° F. for ten minutes, it in turn to be followed by the ice-bag to the hypogastrium or the cold compress over the hypogastrium and inner surfaces of the thighs. During the application of the ice-bag or compress the hot-water bag should be applied to the feet. Every two or three hours the treatment above outlined must be repeated and the interval gradually lengthened with the patient's improvement.

In the chronic stage the most satisfactory method is a combination of general and local measures, of which the following has proven very satisfactory to the author: As soon as the patient is convalescent and up and about we may discontinue the cold sponge and use in its place the electric light bath to point of free perspiration, or the superheated dry hot air body apparatus at 200° to 300° F. for twenty to forty minutes. These procedures, of which the writer believes the latter to be the better, are to be followed by the horizontal rain bath at 100° to 104° F. for one minute, reduced to 65° F. for one-fourth minute, pressure twenty-five to thirty pounds, followed by the cold sitz bath at 65° to 50° F. for two to five minutes, with rigorous friction to the hypogastrium and inner surfaces of the thighs by the patient and lower back and hips by the attendant. As soon as possible we should commence the use of the following treatment, which can only be applied to patients who are in good condition and whose reaction is prompt and strong: Electric light bath as above; horizontal rain bath at 105° F. for one and one-half minutes, pressure twenty-five pounds, followed by the jet douche to the spine and posterior aspect of the lower limbs at 65° F. for ten seconds, followed by the fan douche to the entire body at the same temperature. During the day, preferably at night and in the morning, we should continue the hot vaginal douche, using one gallon of normal saline solution. Where the above treatment cannot be carried out the following may be instituted: A fomentation to the hypogastrium and inner surfaces of the thighs at 130° to 160° F. for ten minutes, repeated for ten minutes, followed by the cold wet half pack, pelvic pack or stimulating compress at 60° F., applied from the middle of the thighs to epigastrium, for thirty to sixty minutes. Where there is pain in the chronic stage of the disease

relief will be frequently obtained by the use of the fomentation at 150° to 160° F. for ten minutes, followed by the application of the ice-bag over a compress to the painful spot. In this stage Kellogg[1] has suggested the use of the alternating vaginal douche, the temperature varying from 110° to 70° F. In the author's very limited experience with this method fair results have been obtained.

Pelvic Pain and Pelvic Congestion.

There are certain conditions of pelvic pain that seem to be present without apparent lesion, that are of a neuralgic or congestive character, and to these the general term of pelvic pain may be applied. This conclusion must be reached by exclusion of all other known causes that would produce the pain.

The essential element, of course, would be to remove all known causes, such as tight bands, corsets, heavy skirts, tight shoes, exposure to wet weather, sexual excess, etc. Where present, anæmia, chlorosis, neurasthenia, hysteria, constipation, etc., are to be treated, the key-note being to build up the general health. The pain and congestion in the acute stage can best be overcome by rest in bed, free purgation with salines, such as Epsom or Crab Orchard salts, and the use of the following measures: A hot vaginal douche of one gallon of normal saline solution, followed by the hot sitz bath to the point of toleration, usually between 110° and 115° F.; the patient is then put to bed and the hot-water bag applied to the feet, and if congestion is present the ice-bag over the seat of pain. When the patient is up we may institute, with positive assurance of success, the general tonic and local measures that have just been mentioned in the consideration of the chronic stage of cellulitis and peritonitis.

Sterility.

Sterility is the inability on the part of a woman to bring forth a living child. It includes women who cannot conceive; those that can conceive, but cannot carry the fetus to a viable age, and hence abort; and those who have borne one or more children but have ceased to be fruitful. The essential of child-bearing is the normal position of the ovule and spermatozoa, endowed with those wonderful physiological properties that result in the development and growth of the fetus. Many ovules traverse the tubes and thousands of spermatozoa perish before they reach their normal destination. On the part of the woman the genital organs may be infantile; the ovule may not be formed from want of development or previous disease; the tube may be closed, bound down or distorted; the uterine secretions may be poisonous; the uterine membrane diseased; mechanical obstacles in the uterus; injurious vaginal secretions; expulsion of the semen by vaginal con-

[1] Kellogg, J. H.: "Rational Hydrotherapy," 1901.

tractions, and bad health. Some women normally conceive poorly, others readily. Frequently the cause lies in the male. About one in every eight or ten marriages are sterile. Syphilis is particularly inimical to fetal viability. The prognosis depends on the cause; if organic and impossible to overcome, there is no hope; these are few. If recognizable, the cause should be removed. On the whole, few women remain sterile all their lives; many bear children after long years of sterility, and some several in succession.

The first thing to be done is to, as far as possible, remove all local causes, such as inflammation; dilate the canal, straightening same and overcoming malposition. General conditions of gout, rheumatism, lithemia, lead and syphilis must be removed. All measures are to be followed out patiently, and success will only be secured where they are persevered in. General and local measures are best combined as follows: Electric light bath to perspiration, or the superheated dry hot-air body apparatus, thirty to sixty minutes, followed by the horizontal rain bath at 102° to 104° F. for one to two minutes, reduced to 80° to 65° F. for one-fourth minute, pressure twenty-five to thirty pounds, followed by the cold sitz bath at 60° to 50° F. for two to five minutes, with friction to the parts immersed. The temperature of the rain bath should be reduced two to three degrees daily until 60° F. is reached. As soon as the patient's reactive power is improved we may follow the rain bath with the jet douche at 60° F. to the middle and lower spine for ten to fifteen seconds, pressure twenty-five to thirty pounds, followed by the cold sitz bath as above. The vaginal douche of normal saline solution, at 110° to 120° F., morning and night and before intercourse, neutralizes the acid discharges, cleanses the parts, stimulates circulation and relieves inflammation. These measures, in conjunction with nutritious diet, exercise and attention to any defect in the general health, will usually prove sufficient.

Menopause.

The menopause, the climacteric, the "critical period," the "change of life," is that epoch in a woman's life characterized by a cessation of menstruation and the ability to bear children. Women can no longer stand the wear and tear nor the drain of child-bearing and menstruation, so Nature kindly closes this function as a protection to the female and to the virility of the child. It usually occurs between the forty-fifth and fiftieth years, sometimes much earlier, sometimes later. This is often a family trait. Early puberty, late menopause; late puberty, early menopause, is the usual rule. It occurs earlier in cold than in warm climates, earlier in the fat and weak, earlier in the nulliparæ than in those who have borne children. Its onset is usually gradual, lasting from two to three or more years. In some cases it is sudden, the menses stopping never to return. Dur-

ing the menopause atrophic changes take place; the vulva flattens and thins; the vagina atrophies and shortens; the uterus becomes small, the cervix is gradually absorbed, the Fallopian tubes and ovaries shrink and finally disappear; the breasts flatten and become flabby; the contour of the body becomes matronly and the abdomen enlarges. The normal menopause should be attended with few local or general symptoms, but the woman of to-day generally suffers severely with circulatory symptoms, vasomotor in character, such as hot flushes of the face and body, with sweating or chilliness afterward, fullness of the head, headache, indistinct vision, insomnia, vertigo, cold hands and feet, epistaxis and other hemorrhages. The nervous system is involved, the woman becoming irritable, hysterical, nervous, depressed, fearful, with neuralgias in the various parts of the body, pruritus, numbness, formications, sometimes melancholia and insanity. In some the sexual passion is much stimulated. The digestive apparatus suffers intensely, with dyspepsia, torpid liver, constipation, flatus, at times diarrhea. Uterine hemorrhage calls for prompt investigation, as women are prone at this time to regard same as a part of the change. It is nearly a sure index of pathological change, and carcinoma should always be feared.

With the commencement of this epoch of a woman's life she should begin to lead an existence that is generally encompassed under the term simplicity. Her time should be engaged in light work, diversion and pleasure; her diet plain and frugal, though nutritious, with little tea and coffee, no malt or alcoholic liquors. Free water-drinking is of great benefit, provided arterial sclerosis is not present. Laxatives, with an occasional saline, will be found beneficial. Very moderate exercise in the fresh air, of which driving is the best, is to be indulged. Of all the methods of overcoming the difficult and disagreeable features of the menopause, hydrotherapy is the most valuable single weapon, because of its physiological action. Upon the nervous system it acts as a tonic, sedative and stimulant; upon elimination, removing the products of defective metabolism; it increases secretion, corrects digestive disturbances and diseases; it heightens mentality, gives to the individual an exhilaration equalled by nothing; and finally upon the heart, circulation and vasomotor mechanism, it so tones, stimulates and restrains their action that the disagreeable palpitation, flushes, fullness, etc., disappear.

In the home, and particularly where the woman is a stranger to cold water, we may commence with the daily cold sponge, best taken upon arising, starting at a temperature of 90° F., reduced two degrees daily to 60° F. Gradually make the cloth wetter and wetter as the reaction improves. Follow the sponge with vigorous friction with a coarse crash towel. Where a member of the family can be pressed into service, we may, when reaction is established, substitute the

dripping sheet, well wet, at a temperature of 60° F. for three minutes, accompanied by vigorous friction and the after-use of the crash towel to promote reaction. Three times during the week the patient takes a full hot bath at 100° to 102° F., following it with one of the above-named treatments, or, what is better, the cold shower at a temperature of 60° to 90° F. for one-fourth to one-third minute. In cities the use of the Turkish bath once or twice weekly will be found satisfactory, provided it is taken under the guidance and direction of a physician.

These cases are by far best treated in sanatoria or hydrotherapeutic institutions in the following manner: Electric light bath to free perspiration, followed by the horizontal rain bath at 100° to 104° F. for one and one-half minutes, reduced to 80° F. for one-fourth minute, pressure twenty-five pounds. Reduce the temperature two to three degrees daily to 60° F., following the bath with vigorous friction to secure reaction, treatment to be given three to six times weekly. At the earliest possible moment use the jet douche at a temperature of 60° F., pressure twenty-five pounds, for ten to twenty seconds, applied to the spine and posterior aspect of the lower limbs. The author's preference is decidedly in favor of the electric light bath in this condition as a form of heating procedure, as he has found it to be rather a specific in its tonic, stimulating properties. It is an artificial sunshine which these women so often need.

Certain special indications oftentimes require to be met:

To improve the *digestion*, we may employ Neptune's girdle worn during the entire night, and should an attack of intercurrent diarrhea occur the sitz bath at 65° to 50° F. with friction to the lower abdomen.

For *insomnia* nothing is superior to the full neutral bath at 94° to 92° F. for thirty to sixty minutes at bedtime, or the use of the full wet pack at 65° F. for one hour just before retiring.

For the treatment of distressing *pruritus*, reference should be made to the section in which this is considered.

For increased *sexual desire* the sitz bath at 92° to 94° F. for twenty to forty minutes at bedtime, or the full neutral bath will be found most satisfactory.

For *local manifestations*, hot douches of normal saline solution and the use of glycerine tampons will give much comfort. *Medicinal measures*, such as bromides, ovarian and thyroid extracts, grains one to five daily, have proven useful.

CHAPTER XXIV.

GENITO-URINARY DISEASES AND SYPHILIS; DISEASES OF THE RECTUM.

Urethritis; Gonorrhea.

Gonorrhea is a specific, contagious inflammation, usually of the mucous membrane of the urethra or vagina, accompanied by a muco-purulent discharge, capable of communicating the disease to other mucous membranes. It is a true specific urethritis, though non-specific urethritis may be set up by sexual contact with one suffering from the disease; it is, in rare instances, transmitted by contaminated objects. The virulence of the infection varies; it is usually surface in character, and involves principally the epithelial layer. The inflammation starts at the meatus and extends backward rapidly, and is characterized by a profuse yellow pus, pain, tenderness, ardor urinæ, chordee, etc. In specific cases the gonococcus is usually present, stains readily with methyl blue, and is decolorized by Gram's method. In women the urethra, vulva, vagina and cervix uteri are involved. Specific infection by the gonococcus is *the most* prolific cause of inflammatory diseases of the pelvic organs of the female. Its sequelæ in the male are many, especially inflammatory conditions of the deep urethra, vesicles, etc. Age and severe attacks confer a certain immunity.

The important element in treatment is cleanliness, prevention of the spread of the infection and destruction of the specific micro-organism. The diet should be low, non-stimulating—that is to say, practically free from meat. Large quantities of water, plain and carbonated, in which may be dissolved potassium acetate, citrate, or bitratrate, should be drunk. An excellent combination is the use of one of these alkalis with spiritus æther nitrosi, freely given so as to render the urinary secretions alkaline, allay irritation and increase its flow. Methylene blue may be given, as it assists in destroying germs; sexual excitement should be forbidden and hydrotherapy immediately instituted. This disease is best met by the frequent immersion of the parts in as hot water as can be borne, together with the use of local irrigation. Permanganate of potassium, 1:3000 to 1:1000, at a temperature of 120° to 130° F., and the very hot sitz bath (105° to 115° F.) for ten to twenty minutes will prove especially efficacious in the relief of pain and in diminishing the dis-

charge. In the female the vaginal douche, three to four quarts of very hot normal saline solution, even to 130° F. if it can be borne, is the treatment par excellence, as the germ is killed by a temperature above 118° F. An excellent method is the use morning and night of 1:1500 to 1:500 permanganate of potassium solution, with the hot normal saline solution every two to three hours between times. After the douche the sitz above described should be used. Where chordee exists the cold compress or the ice-bag may be applied for the length of time that is needed to control the trouble.

In the chronic stage the prostatitis, vesiculitis and urethritis must be met; the reader is referred to these sections for further information. In the chronic stage of the disease recovery can be materially aided by the use of the psychrophore of Winternitz for ten to fifteen minutes at a temperature of 50° to 60° F., or an alternating temperature may be employed ranging from 105° to 50° F.

Epididymitis.

Epididymitis is an inflammation of the epididymis, usually inflammatory in character, but may be syphilitic or tubercular. With the last-mentioned the general treatment of tuberculosis and surgical measures are indicated. Sterility is the usual result. The syphilitic variety requires the measures mentioned under this head. It most commonly results by the extension of gonorrheal inflammation through the sac to the epididymis. The cord is swollen and tender, there is pain in the back, the testicle swells, is tender and walking is difficult. Suppuration rarely occurs; resolution is most common, although traces remain for long times, as shown by the irregular outline of the organ.

Where any serious inflammation exists, epididymitis is dangerous, in that it may render the individual sterile, and for that reason demands more careful attention to its handling than it is usually accorded. Rest in bed should be enjoined, and saline, such as Rochelle or Crab Orchard, prescribed to the point of purgation. The diet must be restricted and low, from which all meat, meat extracts and soups are removed. Water should be freely drunk and alkaline antiseptic diuretics administered. The best treatment is the hot sitz bath at 105° to 110° F. for ten to twenty minutes, two to three times daily, followed by the cold stimulating compress at 60° to 50° F., or the ice-bag. Where the sitz cannot be used the fomentation at 150° to 160° F., applied for ten minutes, repeated for ten minutes and followed by the compress or ice-bag, will be found an excellent method of allaying inflammation. In some cases the wetting of the compress with lead and opium wash will materially aid in allaying pain.

Orchitis.

Orchitis is an inflammation of the testicle, caused most usually by extension of gonorrheal infection or traumatism. Parotitis, syphilis and tuberculosis occasionally produce the inflammation. The last two require specific measures enumerated under other headings. Orchitis is usually characterized by dull, sickening pain, radiating to the back and hips, swelling, tenderness, difficulty of locomotion, etc. Nausea is frequently present. Suppuration rarely results, sterility fairly often. There is no difference in the treatment between the metastatic form accompanying mumps and the inflammatory variety.

The patient should be confined in bed and forbidden to stand much or walk about. The scrotum is suspended by means of a gauze band attached to another band encircling the body. Saline laxatives, Epsom, Rochelle or Crab Orchard, in full doses to catharsis. The diet must be limited and meats excluded entirely. Alkaline and antiseptic diuretics given, well diluted with water, until the urine is distinctly alkaline. The most satisfactory treatment is the following: Morning and night the hot sitz bath at 105° to 115° F., if possible, for ten or fifteen minutes, after which the compress dipped in a solution of lead and opium or lead and laudanum is applied over the affected parts, over which the ice-bag is placed. Every two or three hours the compress and ice-bag are removed and the fomentation at 130° to 160° F. is applied for ten minutes, repeated for ten minutes, to be again in its turn followed by the medicated compress and the ice-bag. Abscess and hydrocele require surgical measures. In the chronic stage general measures are demanded, of which the best is the following: Electric light bath or hot-air bath to point of free perspiration, followed by the horizontal rain bath at 100° to 104° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure thirty pounds. Reduce the cold water two degrees daily to 60° F. As soon as the patient is able and his reaction justifies it, finish the above treatment with the jet douche to the spine at 60° F. for ten seconds and the fan douche to the body for ten seconds. Where it is not possible to secure the above treatment, the full hot bath may be employed, followed by the dripping sheet at 65° to 50° F. for three minutes, with vigorous friction. A suspensory bandage should be worn. If general or localized areas of hard and inflammatory tissue remain, they may be anointed with the ungentum hydrargyrum.

Prostatitis, Acute and Chronic.

Prostatitis is an inflammation of the prostate, usually follicular, sometimes parenchymatous. It is characterized by heat and fullness in the perineum, frequent urination, pain in varying degree, tenesmus, congestion and enlargement of the gland. The parenchymatous

variety, in which all the structures are involved, is usually more severe in its manifestations, fever and increased pulse rate being present. Both forms usually follow a posterior urethritis, generally of gonorrheal origin, the onset being sudden. Physical examination settles the diagnosis.

This is a disease that cannot be trifled with, owing to the serious consequences that are apt to follow inflammation of the prostate gland. Depending upon the seriousness of the attack, we may insist upon rest in bed, upon liquid and low diet, of which iced milk and iced water alternately every three hours is by far the best treatment. The minimum water that should be drunk during twenty-four hours is one gallon. Catharsis must be induced by salines and the urine rendered alkaline by the use of acetate, citrate or bitartrate of potassium, the hips being elevated by means of a pillow. Irrigation of the bowel and bladder with hot normal saline solution will go a long way toward relieving suffering and discomfort. Every four hours the patient should be given a hot sitz bath at 105° to 110° F., if possible 115° F., for ten or twelve minutes. Should this treatment fail to relieve the suffering and lessen the inflammation, the administration each hour of the fomentation at 130° to 160° F., applied to the perineum, will almost surely give relief.

Chronic Prostatitis.

Chronic prostatitis is characterized by the occasional discharge of a clear viscid fluid, especially after an evacuation of the bowels; frequent urination, dull pains in the perineum, in the loins, some perineal tenderness, sensitiveness to pressure from the rectum, mental anxiety and depression. The urine is usually cloudy, and contains mucopurulent shreds and epithelium from the prostate. It may become the nidus for reinfection, causing lingering gonorrhea; may cause sexual neurasthenia, impotence, sterility. Patients who have had this disease following gonorrhea should have a most careful examination of the secretions stripped from the prostate for fear of infection of the wife. It is often a sequel of acute gonorrhea, but may develop slowly and insidiously. Sometimes improper instrumentation, irritating injections, hemorrhoids and foreign bodies start the trouble. Attenuated pyogenic infection has been noted as producing a mild form.

These cases are nearly always much run down and therefore demand general attention. The diet should be generous and free from pepper, vinegar, mustard, pickles, tomatoes, and too much meat; moderate exercise in the open air and the free drinking of water are to be insisted upon. The urine must be made sterile and antiseptic by the use of urotropin. Sexual continence is a *sine qua non*. General tonic hydrotherapeutic measures should be em-

ployed—the electric light bath to moderate perspiration, followed by the rain bath at 100° to 104° F. for one minute, reduced to 80° F. for one-fourth minute, pressure twenty pounds; reduce the temperature two degrees daily to 60° F. and increase the pressure one pound daily until thirty is registered. This treatment should be followed by one of the following two methods: Either the cold sitz bath at 60° to 50° F. for five to ten minutes, with friction, applied to the inner surfaces of the thighs, lower abdomen and back, or the perineal douche for one to two minutes at 55° to 45° F. with strong pressure. This latter treatment causes, reflexly, contraction of the blood-vessels of the prostate, and in this way relieves congestion. The following combination has yielded in a number of cases the best results: The prostate is massaged two or three times weekly; the electric light bath, rain bath and perineal douche as above described, administered daily. This results in an emptying of the ducts of the prostate, improves the circulation and causes the absorption of the inflammatory deposits. Results are almost immediately noticed in the relief of nervous depression, weakness and the sense of weight and tenderness in the prostatic region. A hot normal saline enema at 105° to 120° F., administered at bedtime, will oftentimes relieve the discomfort, as will the alternating hot and cold irrigation of the rectum by means of a properly constructed irrigator. Where the above treatments cannot be carried out the following will sometimes prove of considerable value: The hot trunk pack applied from the middle of the thigh to the epigastrium at 130° to 130° F. for thirty minutes, to be followed by the ice-bag to the perineum for fifteen to thirty minutes.

Spermatorrhea; Sexual Neurasthenia.

Under this term we group true spermatorrhea, diurnal and nocturnal emissions, and the false spermatorrhea of defecation. The frequent evacuation of semen in the waking hours and in the absence of coitus or mechanical irritation is abnormal. The presence of this disease can only be absolutely diagnosticated by microscopic examination, and the occasional presence of spermatozoa is to be considered of no importance. True spermatorrhea, in which there is a passive loss of semen unattended with pleasurable sensations, is in my experience a rare disease. False spermatorrhea, which takes place habitually after or during defecation, and in which no seminal elements are present, is the cause of a great deal of mental agony on the part of supersensitive men. This fluid, which is derived from the mucous glands of the urethra and prostate, is passed while straining at stool or at the end of urination, and is falsely considered to be semen. The condition often produces mental depression, neurasthenia, hypochondriacal state, etc.

Seminal emissions may be diurnal or nocturnal, most commonly the latter. It is a physiological condition within certain limits, and is to be expected in human males during the period of their sexual activity, provided the seminal vesicles are not otherwise emptied. So long as they are not too frequent and do not affect the general health, they are mere incidents and do not concern the physician. If the general health fails, and headache, insomnia, neuralgia, loss of appetite and genital irritability appear, they become pathological. Frequency as to normal is to be determined by the personal equation, the general health being the guide. Their frequency often depends upon cleanliness of mind, the avoidance of immoral pictures, the eschewing of lewd and lascivious conversation and thoughts. It may be roughly gauged at from seven to fourteen days. Some by nature rarely have emissions. They are caused by onanism, diseases of the spinal cord, neurasthenia, debility, anemia, etc. Heredity is a factor, just as are sexual instincts and practices. Gonorrhea and its sequelæ, local diseases of the genitalia and rectum may produce emissions.

Onanism may be here considered. It constitutes a series of acts, deviating from normal intercourse, by which the sexual orgasm is produced. It is a frequent habit with men and women, and covers all of those acts embraced under the terms of masturbation (solitary self-pollution), withdrawal from the vagina, coitus in os, intermammæ, mechanical friction of all kinds, and psychic imagery without mechanical aid. Though ancient in custom, it is more to be honored in the breach than in the observance, for it is degrading and dishonorable. The disastrous results are much over-rated, and are more to be found in the flaming literature of the quack vampire that sucks the blood of his misguided victim than in stern reality. It may result from instruction by elders; from irritations arising in the genital tract; in others from psychological conditions. Harm results from too frequent repetition of the act, from the psychic influence that results, but in this, as in spermatorrhea, the effect upon the general health is the guide. The female may perform onanistic and copulative acts many times more frequently, over long periods, without suffering anything like the same results that occur to the male. The consciousness of wrong-doing, the fear of consequences, the knowledge of the degradation of the act, have more to do with results than the physical loss and irritation. Kraft-Ebing says: "It injures the whole sexual foundation, the basis of all ideal activities; it extinguishes the fire of sensuality and sensual feeling, the most powerful incentive to the putting forth of strength in both individual and social existence in the world of beauty and morality." It is a common practice among the insane and idiotic. Young children, youths and girls, should be early watched to prevent onanism, and taught by parents and educators to avoid entering upon a habit that is morally bad. The mental status of these

cases is such that it detracts from their capabilities and effectiveness. Neurasthenia and neurasthenoid symptoms usually result.

Sexual excesses are common, and nothing more so than excessive coitus. A safe guide as to frequency is the sense of well-being, buoyancy, clearer mind and greater inclination to work that succeeds the cohabitation. The reverse, premature ejaculation and weakness, calls for cessation and reduction. Excess is purely a relative term, some men possessing great, others weak, virile powers, so that individual capacity must govern our judgment. Abnormal stimulation, mentally or physically, irritations located in the genitals, prostate or in the urethral canal, may lead to excessive coitus. Restraint of sexual passion—excitement without gratification, failure of gratification by normal coitus—may become the cause of seminal emissions. Thus Nature's great wisdom is shown, that the extremes of prolonged continence and excessive coitus produce the same results. It teaches that in this, as in all functions, sweet moderation must govern. Abnormal stimulation, psychic or mechanical, improper reading and suggestive pictures, should not form part of or pander to the sexual desire, but it should spring from that normal mental and physical necessity, inherent in the healthy individual of either sex, that finds its outlet in natural and judicious performance of the act of sexual congress. Both sexes are better for reasonable indulgence and gratification of this dominant instinct, and where failure, excess and abnormality exist, disease, misery and unhappiness follow. It is a hidden center from which many troubles originate, and the physician finds it out oftentimes too late to save and prevent suffering—somatic and psychic.

In the management of these cases the physician cannot alone perform his function as such, but must become an educator along sexual lines. To this end the patient must be instructed with regard to vicious habits, indiscretions corrected, and a mental, physical and sexual hygiene outlined. The diet should be nutritious, non-stimulating, with a moderate amount of meat and no condiments. Alcohol in all shapes and forms is to be absolutely forbidden. Exercise, especially the bicycle, is to be recommended, provided a proper seat is secured that will free the prostate from pressure. The bladder and bowel should be emptied at bedtime, the latter by means of an enema if necessary. The general hydrotherapeutic treatment is most important, reconstructing, as it does, the general health, and is oftentimes all that is necessary to bring about recovery. In the home we may employ the cold sponge at 60° to 50° F., applied on arising, or the cold plunge at 60° F. Hydriatists commence with the electric light bath to free perspiration, followed by the horizontal rain bath at 100° to 102° F. for one or two minutes, reduced to 80° F. for one-fourth minute, pressure twenty pounds; reduce temperature of cold water two degrees to 60° F. and increase pressure one pound daily until

thirty is registered. These baths should be followed by the cold sitz bath at 60° to 50° F. for three to five minutes, accompanied by friction to the parts immersed. When the patient's reaction is established and the cold water of the rain bath has been reduced to 60° F., we may add to the above the Scottish or alternate douche at 102° to 104° F. for one-fourth to one-half minute, reduced to 60° F. for five to ten seconds, three to four alternations. Always finish this douche with a cold application to the feet. An excellent method of treatment is the following: Electric light and rain bath as above described, followed by the jet douche at 60° F. to the spine and lower limbs for ten seconds, the fan douche to the body for five to ten seconds, and the perineal douche at 50° to 45° F., strong pressure, for one to two minutes. This is a powerful treatment, and should not be applied unless the patient reacts promptly. Where there is great irritability and the patient seems to respond poorly to even gentle general measures, we oftentimes find that a preliminary course of treatment by the neutral sitz bath at 92° to 95° F. for fifteen to thirty minutes will prepare the patient for the stronger and more active general measures.

Local treatment should embrace the removal of phimosis, stricture, vesiculitis, urethritis, etc., as well as the correction of any rectal disease, such as fissure, fistula, hemorrhoids, etc. An excellent local application is the psychrophore, using water at a temperature of 70° to 50° F. for two to five minutes daily. The cold sound, faradic and galvanic electricity, the application of medicaments to the urethra, rectal irrigation with hot normal saline and antiseptic irrigation of the canal will be at times indicated, in addition to the above treatment.

Impotence.

By *impotentia coeundi* we mean the inability on the part of the male to perform the act of copulation, a physiological power inherent in every normal individual. It may be due to congenital defects (organic impotence), functional disease, psychic states, pathological conditions, etc. Deficiency of erection, as regards quality and duration, local irritations, premature ejaculation, fear, worry, etc., may prove effective. In ill-health, in weakness, in frail and delicate persons, there is oftentimes manifested a coldness toward the opposite sex. Intense mental preoccupation, grief, apprehension and financial reverses, may act as temporary causes. Onanism, prostatitis, gonorrhea, orchitis, cystitis and sexual neurasthenia are frequently at the bottom of the disorder, and demand attention. It may be stated that the height of pleasure can only enter into the act of sexual congress where congeniality and love exists between the two normal individuals concerned. This explains the impotence that follows an indifference or repelling coldness on the part of either partner.

Irritable weakness or irritable impotence is a condition in which the erection cannot be maintained in a sufficiently vigorous and lasting state until such time as to permit the performance of a series of mechanical acts or movements within the vagina necessary to produce a normal orgasm. This is most frequently accompanied by premature ejaculation before introduction or just after entrance is effected. Rigidity is suddenly lost; shame, a sense of loss of manly power and disgrace takes place. These individuals are usually neurotic or neurasthenic, nervous, irritable and high-strung. Hyperesthesia and congestion of the mucous membrane of the urethra are present. A preceding gonorrhea is a common history.

Paralytic impotence, in which no—or at best an imperfect—erection takes place, is the common form, and is usually accompanied by paralysis of the bulbo-cavernosa and weakness of the general musculature of the genital tract. Injuries and diseases of the spinal cord, syphilis, anemia, nerve exhaustion, tuberculosis, nephritis, and many drugs produce the condition. The prognosis in the organic form depends on surgical possibilities; the paralytic is questionable, but in the psychic, functional, irritable, etc., it is good.

Measures to be used in this condition will be determined largely by the general condition producing the disease. The hydrotherapeutic treatment is satisfactory, and should be both general and local. Commence by giving the electric light bath until moderate perspiration ensues, followed by the horizontal rain bath at 100° to 102° F. for one to two minutes. Reduce the temperature two degrees daily to 60° F. and make the pressure thirty pounds. This treatment should be followed by the cold sitz bath, 60° to 50° F., for three to five minutes. As soon as the patient has established an excellent reaction we may add to the electric light bath and horizontal rain bath above mentioned the jet douche to the spine and posterior aspects of the lower limbs at a temperature of 60° F. for ten to fifteen seconds under a pressure of thirty pounds. Especial attention should be paid to the lower half of the spine. The perineal douche at 60° F. is a valuable measure.

Local measures that have proven satisfactory in the treatment of this disorder is the psychrophore of Winternitz, using water at a temperature of 60° to 50° F. for five to ten minutes daily. Some writers speak favorably of the rectal irrigator, the bulb of which is pressed against the prostate, employing water at 60° to 50° F. for five to ten minutes. Where the treatments above mentioned cannot be carried out, the one best method to be employed in the home is the cold sitz bath at 80° F. for ten to fifteen minutes, reduced three to five degrees daily to 60° or 50° F.

Priapism.

Priapism is a more or less continuous erection, without sexual desire. Prolonged mental exertion, over-anxiety, diseases of the brain and cord, neurotic prostatic disorders, leucocythemia, etc., produce the disorder. Mackie thinks a small extravasation of blood in the corpus cavernosum is the immediate cause of the priapism. In children a tight prepuce, stone in the bladder or worms in the rectum may cause it. In its management, sedative and motor-depressant drugs, in connection with hydrotherapy, will bring about a cure save in those instances where organic incurable conditions are present.

Causal conditions must be sought for and hygienic lines instituted. The diet should be generous, the amount of meat limited; moderate exercise and free water-drinking are indicated. The author has found in the three successful cases that have come under his care that the following general tonic treatment and local measures have been most satisfactory: Commence with the electric light bath to free perspiration, followed by the horizontal rain bath at 104° F. for one minute, reduced to 80° F. for one-fourth minute, this in its turn to be followed by the neutral sitz bath at 92° to 94° for twenty to thirty minutes. The cold water of the rain bath should be gradually reduced one degree daily until the patient can stand a temperature of 65° F. When this point has been reached give the following: Electric light bath to free perspiration, followed by the jet douche to the dorso-lumbo-sacral spine and thighs as hot as can be borne, 115° to 120° F. if possible, for one or even two minutes, this to be followed by the neutral sitz bath at 92° F. for thirty minutes. In the home, or where institutional treatment cannot be obtained, we may use the same general measures as are suggested in spermatorrhœa, followed by the half bath at the neutral temperature of 92° F. for thirty minutes.

Neuroses and Neuralgia.

Nervous and neurotic males may suffer from many forms of nerve manifestations of the generative organs, which are a source of considerable anxiety, worry, mental distress and physical suffering. It will generally be observed that they are the victims of some of the major neuroses or psychoneuroses, digestive disorders, gout, rheumatism, lithæmia, etc. These general conditions require that particular treatment which has been heretofore outlined under special headings. In the local management of such cases great care must be exercised to seek for and remove any sources of irritation and trouble about the genitals, rectum and anus. The *general* management of the case is very much more important than the *local*, though a combination is frequently more effective.

These cases require careful examination in order to reach a proper diagnosis. A free life should be required, moderate outdoor exercise prescribed, generous dietary given and tonics administered. Nowhere in the range of medical practice will more satisfactory results be obtained than in the use of hydrotherapy in these seemingly intractable and disagreeable conditions. Most cases are in fair *general* health, and are best treated in institutions, and for that reason we may at once commence with the following treatment: Electric light bath to free perspiration if robust, or moderate perspiration if weak and anemic. This should be followed by the horizontal rain bath at 100° to 104° F. for one minute, reduced to 80° F. for one-fourth minute, twenty pounds pressure. Reduce the cold water two degrees to 60° F. and increase the pressure one pound daily until thirty is registered. As soon as possible the jet douche is to be added to the above treatment at a temperature of 60° F. applied up and down the spine and posterior aspect of the lower limbs, for one-fourth minute, pressure thirty pounds. From the start these treatments should be followed by the cold sitz bath at 65° F. for three to five minutes, with friction applied to the inner surfaces of the thighs, lower abdomen and back.

Where *pain* is constantly present nothing is more satisfactory than the use at bedtime of either of the following treatments: Hot trunk pack from the epigastrium to the middle of the thighs for thirty minutes, followed by the cold sitz bath for two to five minutes at 70° to 50° F., or the hot sitz bath at 105° to 110° F. for ten to fifteen minutes, finishing the treatment with an affusion to hips and lower abdomen at 60° to 50° F.

If *hyperesthesia* is present, the neutral temperatures of 90° to 92° F. should be employed, and the practitioner may take his choice of the neutral full bath, neutral half bath or the neutral sitz bath for periods ranging from twenty to sixty minutes. Where the patient cannot be induced to carry out this treatment, the application at home of the cold sitz bath alone at a temperature of 60° F. for ten minutes will oftentimes work wonders.

Syphilis—Lues—Pox.

Syphilis is a chronic infectious disease due to the presence and growth in the human body of a specific fixed contagion, possibly the spirochæta pallida. It originates from another case, has its incubation, its orderly progression of symptoms, constitutional and local; sequelæ occur and inoculation protects from reinfection except in extremely rare cases. Infection may occur at any point on the skin or mucous membranes. Its stage of incubation is ten to fifty days, its initial lesion a chancre, a hard brownish-red nodule, which may erode or ulcerate. This is followed by a lymphangitis, and the ger-

eral overflow or development in the system of the poison, followed by a secondary stage, accompanied by fever, malaise, anorexia, headache, pains in the limbs, nervous symptoms and general eruptions upon the skin—macular, papular or tubercular in character, and upon the mucous membranes as simple inflammation, mucous patches, moist papules and condylomata. The hair falls out and the nails, eyes, ears, etc., may be affected. The lesions are inflammatory in character, and subside under treatment. This stage lasts from one to three years. Periods of latency occur in which there are no subjective or objective symptoms. The virus is transmissible in these stages, but not in the next or tertiary, which is marked by the presence of deep-seated inflammation and gummata. These occur in a very small minority of cases. Syphilis is becoming attenuated; most cases are benign. Treatment mitigates and removes its phenomena, may prevent their appearance, and hastens its cure. But, treated or untreated, the malady ends at some time, though its exact limits have never been settled. The disease may be inherited. Unclean habits, epithelium that has been macerated or eroded, extreme length of prepuce, alcoholism (irritating mucous membranes), predispose. Indiscriminate sexual congress is the most frequent direct cause. Many cases are contracted while under the influence of alcohol because of sexual exposure with individuals that at other times would be abhorrent were the individual in his or her normal condition. The pathological changes found are those of inflammation and inflammatory deposits. Evidence seems to point strongly to the curability of syphilis. It is a disease essentially benign so far as danger to life is concerned, and average longevity is not seriously diminished. Syphilitics who have followed out their courses of treatment carefully can usually with safety marry at the end of three years, provided there are no present symptoms and none have been present for some time. In proportion to syphilis, few parasyphilitic diseases result. Many cases, in the author's opinion, would not result had the patient avoided alcohol, tobacco and other excesses. The depreciation of tissue and nutrition that results from their use makes them the most baneful of predisposing causes.

The author believes that the present position of advanced thinkers upon the treatment of syphilis may be summed up in the following propositions: That the disease or poison is not to be destroyed but slowly and certainly combated by the continuous moderate "tonic" use of mercury just short of its physiological effects; that the action of this drug is to remove by fatty degeneration the syphilitic deposits; it is not to be used in large antidotal doses, but as an eliminant, and that the better the general health the less influence the syphilitic poison will have upon the system. As a natural corollary to these propositions, we may say that hydrotherapy in combination with anti-syphilitic medication is a method worthy of

more attention than syphilographers have as yet given to this subject. The combination of hydrotherapy with antisyphilitic medication enables us to use much smaller doses of mercury and the iodides, and at the same time prevents the untoward and disagreeable effects. The author has seen many cases who were unable to take, assimilate and utilize specific medication, after a short preliminary hydriatic treatment, receive all the benefits that arise from the specific action of these medicines. The powerful thermic and mechanical action of water applied to the cutaneous surface, together with the stimulating influence of heating procedures now used, bring about rapid elimination of the soluble toxins of the germ, and more slowly, but none the less surely, the inflammatory deposits that are present in the tissues of the patient. These facts apply to mercury no matter whether the internal, inunction or hypodermic method is employed.

The patient afflicted with this infection should lead a quiet life and as far as possible an uneventful one, taking moderate exercise in the open air and avoiding physical strain. The diet should be nutritious and consist largely of cereals, vegetables, fruits, etc.

The author was much impressed in reading an account of the treatment of this disease by the Sandwich Islanders, in which the individual is subjected to the action of the sun while covered with a thin layer of sea sand, and after free perspiration, takes a cold plunge in the surf. The results obtained were excellent, even though no drugs were used. The author believes that in the incandescent electric light bath the physician has a remedy at hand that is nearly a panacea and possesses qualities beyond the merely spoliative effects of heat. He is not prepared to state the exact *modus operandi* of the electric light bath, but knows it to be a clinical fact that individuals who have resisted treatment over long periods have almost immediately begun to improve where the electric light bath was instituted. The following method has given the author so much satisfaction that with slight variations it has become his standard method of treatment of this disease. The rules and regulations that are to govern the patient are laid down, tonic doses of mercury or the iodides, or both, are given, and in addition the following: Electric light bath to point of free perspiration, followed by the half bath at 70° F. for three minutes, with friction applied by the patient and attendant to the parts immersed. The temperature of the bath is reduced one degree daily to 60° F.; the bath is finished by an affusion to the back and chest at 40° F. The patient's reactive capacity having been fully established, we may proceed to the following measures: The electric light bath to free perspiration; horizontal rain bath at 103° to 105° F. for one to one and one-half minutes, reduced to 80° to 60° F. for one-fourth minute, pressure thirty pounds; this to be immediately followed by the jet douche to the spine and the fan douche to the

body at 60° F. for ten to twenty seconds, pressure thirty pounds. Where the electric light bath cannot be secured the vapor, hot air or superheated dry hot air body apparatus may be substituted and good results obtained, but the electric light bath is the undisputed and leading heating method in this disease. When the disease is mitigated and the period of latency occurs it is an excellent plan to recommend to our patients to discontinue all medication and spend from three to six weeks at the seashore indulging in surf bathing. Where this, the treatment *par excellence*, cannot be carried out, we may substitute in the home the use of the hot-air cabinet, in which the patient should remain until free perspiration, or the full hot bath at 102° to 105° F. as a preliminary heating measure. Care should be taken in both instances to keep the head cool. They should be followed by the cold sponge at 80° F., reducing two degrees daily to 60° F., making the sponge or towel wetter and wetter as the temperature is reduced. The cold shower at the same temperatures or the cold half bath and affusion may be employed.

Cachexia.—The syphilitic poison acting upon the general and nutritional processes of the body sometimes exerts a pernicious retrograde action that produces a tissue starvation. This is most frequently accompanied by an intense anemia and a failure of the assimilative functions. In these cases we frequently have also to deal with overdosage of mercurials and iodides. Hydrotherapy produces almost immediate results, and where used from the start, avoids and prevents the condition.

Mercurialism.—The excessive use of mercury may produce grave results and a cachexia. Its excessive use is marked by the presence of a metallic taste in the mouth, salivation, gingivitis, stomatitis, a foul oral odor, colicky abdominal pains, diarrhea, dysentery, insomnia, erythema, caries of the teeth and sometimes polyneuritis. In those, however, who are cleanly in person, who take the trouble to keep their teeth and mouth clean, whose skin is active, whose circulation is good, will avoid the untoward effects of mercury. Treatment involves the immediate cessation of the drug and the full eliminant methods mentioned under the treatment of the disease itself.

Suppression of Urine.

In this condition the urinary secretion is checked and no fluid flows from the kidney through the ureters to the bladder. It may originate from trauma, fright, emotions, mental distress, from cold, by operations on the bladder, from pervious chronic nephritis, etc. No urine—or very little, highly colored—is voided. Suppression is a dangerous symptom, especially if long continued. Upon catheterization the bladder is empty. Depression, languor, apprehension, chill, vomiting and headache, with possibility of coma, are its accompaniments.

The treatment is both general and local. A dose of some saline cathartic of sufficient size to actively stimulate the bowel, together with the ingestion of hot drinks containing acetate or bitartrate of potassium, should be administered. Give a hot normal saline enema, followed by a fomentation at 130° to 160° F., applied over both kidneys for ten minutes, repeated for ten minutes, while at the same time the ice-bag is applied to the lower third of the sternum. In severe cases the use of hypodermoclysis (500 to 1000 c.c. of normal saline solution) will be found an excellent measure. General hot applications may be made. The full warm bath at 102° to 105° F. for five to ten minutes, followed by the full dry pack for thirty minutes, or the use of the superheated dry hot air body apparatus at a temperature of 250° to 350° F. for twenty to sixty minutes, or the electric light bath, full strength, to point of free perspiration may be employed. After the last two named we may employ the full dry pack for thirty to sixty minutes. In chronic cases the neutral bath at a temperature of 92° to 94° F. for twenty to sixty minutes, or the Nauheim or effervescing bath at 90° F. for ten minutes, will be found excellent methods, as they stimulate the skin circulation without inducing depressing effects. The author considers the electric light bath to be the most serviceable method, and far superior to any other form of treatment for this disorder, the skin being excited to a high degree of activity, at the same time that tonic and stimulating effects are produced.

Cystitis—Irritable Bladder.

Catarrh of the bladder is an inflammation of the vesical mucous membrane, characterized by hypogastric pain, frequent and scanty micturition, vesical tenesmus, rigors, pyuria and some fever. It originates from some irritative or pyogenic infection. The chronic form is apt to run a tedious and long course. The cystoscope will be found useful as a diagnostic agent. During the acute stage of the disease the diet should be largely soft or liquid, consisting of milk, eggs and broth. The patient is to drink freely of water, especially Vichy water with soda. If the reaction of the urine is found to be alkaline we may administer benzoic acid; if ammoniacal, salol. Salines may be administered to the point of free catharsis. The intense pain is best relieved by the use of the hot enema, and the irrigation of the vesical viscus with a hot solution of permanganate of potassium (1:4000) at a temperature of 105° to 110° F. This should be followed by the application of very hot fomentations over the bladder region. In the chronic form use a liberal diet, for the most part freed of meat. The free drinking of alkaline water should be continued and urotropin administered in five grain doses three to four times daily. The bladder should be irrigated once—rarely twice—daily

with the permanganate solution, 1-4000 or 1-5000 strength, gradually increased, or a boric acid solution used. The hot sitz bath at 115° to 120° F. for three to five minutes, followed by a quick affusion of cold water to the hips, will probably do more to permanently relieve the vesical irritation than almost any other single measure. The sitz bath at 95° F. for thirty to sixty minutes is employed by some hydriatists, but the writer has not found it of as much benefit as the treatment just outlined. It goes without saying that at the same time the general health of the patient should be built up by tonic hydrotherapeutic measures, and such causal conditions as may be producing the inflammation treated in connection with the vesical disease.

Hunner[1] has found the use of the continuous warm (100° F.) or neutral (94° to 97° F.) bath of value in the management of chronic and intractable cases of cystitis, especially in women, employing continuous irrigation of the bladder at the same time. The tubs used are those usually employed in the full bath treatment of typhoid fever.

In hospital work the tub is filled every morning to the desired depth with water at about 100° F., taken directly from the city supply pipes by means of a hose. To keep the temperature equable after the patient has been for some hours in the tub, two or three pails of water are withdrawn from the spigot and the desired quantity of hot water is poured into the tub from above. During the usual day of eight hours in the tub this changing of water is necessary from one to three times, according to the temperature of the room. If one were having a tub made especially for the continuous bath treatment it would be advisable to have built in the tub at one end a small recess under which could be placed a Bunsen gas burner or small oil lamp so adjusted as to keep the water at a constant temperature. The patient sits or lies on strips of canvas which stretch across the tub and are held in position by brass clips. These canvas strips are about twenty-two inches wide, and may be folded if narrower strips become desirable. The strip at the head of the tub, on which rest the pillows, is stretched as tightly as possible to form a back rest if the patient is sitting, and if she be reclining this strip is slackened. The strip at the foot may be separated a few inches from the middle strip on which the patient sits, in order that she may easily pass her feet between them to the floor of the tub and thus gain a rest by change of position. Light slats across the tub are covered by a blanket and mackintosh, and these in turn by a white sheet or spread. This covering serves to retain the heat, makes a "work-table" for the patient, and presents a neat appearance.

If a continuous irrigation is desired a gallon bottle rigged with a

1 Hunner, Guy L.: Journal American Medical Association, December 21, 1907, "The Tub-Bath Treatment of Cystitis."

siphon rod and rubber tubing and set on a box on a table near the tub will serve as a supply tank. If the patient is not excoriated about the genitalia, and particularly if she has little or no bladder pain, she does not require the sitz bath, and the tub may be used without the water. The patient sits on the dry canvas strips, two of which are so separated under the buttocks as to allow the irrigation to run through to the bottom of the tub. In this manner a constant irrigation can be kept flowing with no other attention than that requisite for the supply bottle or tank. The force of the stream entering the bladder is regulated by the height of the supply tank, and the patient can modify the stream at any time by changing the calibre of the supply tubing through the use of an artery clamp applied to the side of the tube. The inflow naturally has to be regulated according to the sensitiveness of the bladder, and to suit the freedom of the outflow, whether this be through a second tube in the urethra or through a suprapubic or vaginal fistula.

These miserable and obnoxious cases, both to themselves and all about them, are made comfortable and free from odor. The intense suffering resulting from the severe inflammation of the pudendal region and thighs, the insomnia, nervousness, anæmia and digestive disturbances, are all relieved. To the nurse it saves an incalculable amount of labor, and the wear and tear upon the patient of changing of pads, gowns, bedding, etc., in the effort to preserve cleanliness. It is "one of the most satisfactory measures in the realm of therapeutics."

Atony of the Bladder.

Atony of the urinary viscus is manifested by a lack of tone, a loss or diminution of its muscular power. After forty it is in moderate degree physiological, being characterized by an inability to eject a forcible stream of urine from the bladder. It may be a true muscular paresis, a flaccid pouch capable of distension to a large extent, but incapable of completely emptying itself. There are all grades and variations. It may result from obstructive conditions, paralysis of the bladder, persistent neglect of Nature's call and acute over-distension long continued. Residual urine is usually present, requiring catheterization and irrigation.

Where the conditions are non-surgical, or after surgical work, the hydriatic method will be found most serviceable. Great care should be paid to the general health of the patient, removing all sources of burden, improving the appetite, digestion, assimilation and elimination. A careful diet, free water-drinking and urinary antiseptics should be employed.

Measures that may be daily employed in the home, and which will be found very efficacious, are the following: Commence with the

cold sponge to the waist and then the remainder of the body, starting at 80° F., reducing five degrees daily until 60° F. is reached. This should be followed by a good vigorous rub with a crash towel until reaction is secured. As soon as 60° F. is reached the warm full bath at 102° to 105° F. for three to five minutes, followed by the cold sponge as above at 60° F., may be employed. The next step should be the use of the warm full bath, followed by a general salt rub to the entire body, terminating the treatment with a cold shower at 60° F.; if the shower cannot be obtained it may be followed by the sponge at the same temperature, rapidly performed, or by an affusion at the same temperature to the chest and back while sitting in about six inches of warm water.

Institutional or sanatorium measures commence with the incandescent electric light bath, hot air, vapor or superheated dry hot air to free perspiration, followed by the rain bath at 102° F. for one minute, reduced to 70° F. for fifteen seconds, daily reduced two degrees until 60° F. is reached. At this point add the jet douche to the spine and gently over the hypogastric region at 60° F., duration ten to fifteen seconds. If the patient is strong, if reaction has been well developed, we may, after reaction has been first secured from the above treatment and the patient dried, employ the alternate hot and cold perineal douche at 110° to 115° F. for a half to three-quarters of a minute, cold (60° to 50° F.) for fifteen seconds, two or three alternations.

In connection with home or institutional treatment nothing will give better results than the use of the cold sitz bath at 80° F. for eight to ten minutes, taking care to keep the lower limbs warm and slightly elevated to prevent pressure of the popliteal space. Lower the temperature one degree daily to 65° or even 60° F. This bath will drain the pelvis and tone up the muscular structure of the viscus.

Where there is any residual urine or inflammation present the bladder should be irrigated or douched with normal saline or boric acid solution, commencing with a temperature of 100° F. and reducing same one to two degrees daily until as cold as the patient can comfortably stand. It is a powerful stimulant to muscular contraction.

Enuresis; Enuresis Nocturna.

Incontinence of urine, usually a symptom rather than a disease, is a condition characterized by the involuntary passage of this excretion. It is often a neurotic manifestation, especially in children, though it may arise from muscular weakness of the bladder neck, over-distension, changes in the composition of the urine and spinal cord disease. The prognosis depends on the cause. In enuresis nocturna, it is favorable, although the treatment is sometimes prolonged. General treatment by all tonic measures is the most essential, and for this

reason we suggest out-of-door life with exercise and full nutritious diet, avoiding meats and salts at supper. Liquids should not be drunk during the late afternoon and evening, and heavy suppers and all forms of cerebral excitement in the evening must be forbidden. It is most essential that any indigestion or constipation present be corrected. We may commence with the use of the electric light bath or the hot air bath until perspiration takes place, following this with the dripping sheet at 70° F. for three minutes, with vigorous friction. Reduce temperature one degree daily until 60° F. is reached. This may be followed by the cold sitz bath at 60° F. for three to five minutes. In the writer's hands this has proven the best treatment for children, supplemented by the use of the hot and cold sponge to the spine at bedtime. In adults we may use the electric light bath or the hot-air bath until perspiration takes place, following this with the rain bath at 105° F. for one and one-half minutes, reduced to 70° F. for one-fourth minute, pressure twenty pounds. Increase pressure one pound daily until thirty is registered and reduce temperature one degree daily to 60° F. At this point we may add the jet douche at 60° F. for one-fourth minute to the spine and the fan douche at 60° F. for one-fourth minute over the abdomen and bladder region. Immediately following the reaction from this bath, administer a cold foot-bath for one-half to one minute. This will frequently overcome the condition. Where possible, patients may supplement their convalescence by having recourse to the swimming bath or surf bathing. In adults hot irrigation of the viscus daily with boric acid solution at a temperature of 100° F., gradually reducing one degree daily until 75° or 80° F. is reached, will very frequently aid in strengthening the local condition. If surgical conditions, such as phimosis, exist, they should be corrected. In connection with the above treatment the author has frequently found the preparations of iron and belladonna of great service.

Retention of Urine.

In retention of urine the urinary bladder fills up and the urine is not or cannot be passed. Mechanical obstruction in the urethra or prostate, spasm of the cut-off muscle, blunted sensation of the bladder in certain fevers, in some brain and spinal cord diseases, in coma, shock, etc., may produce the condition. In retention the bladder is dull on percussion, in suppression tympanitic; pressure causes desire to urinate.

The first endeavor should be to catheterize the patient, followed by an irrigation of hot boric acid solution. Sometimes the retention can be overcome, if it is spasmodic, by the use of the hot enema, followed by the sitz bath as hot as can be borne. Where the disease is due to a lack of muscular power of this viscus, general

hydriatic measures will build up the general health and increase the muscular tone of the bladder. It will be found serviceable in connection with the application of the cold douche to the bladder region. Give an electric light bath to the point of free perspiration, followed by the horizontal rain bath at 102° to 104° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure thirty pounds; reduce the cold water two degrees daily to 60° F. When this has been reached add to the above treatment the jet douche at 60° F., pressure thirty pounds, applied to the spine and posterior aspect of the limbs, finishing the treatment by a strong douche to the feet and a gentler one over the bladder region. It seems needless to say that this remedy should be withheld in a case of retention from obstruction.

Fissure of the Anus and Irritable Ulcer of the Rectum; Sphincterismus.

Primarily these conditions commence as a superficial breach of the mucous membrane in the anal region, which, if unhealed, finally results in the formation of an ulcer of the bowel which may involve the mucous and submucous coats, giving rise to a spasmodic contraction of the parts and exquisite paroxysmal pain. These affections are quite common, and occur more frequently in women than in men. It may result from constipation, diarrhœa, dysentery, surgical operations, trauma, etc. Fissure and ulcer are insignificant in size, but give rise to widespread reflex disturbances, due to their location, usually at the muco-cutaneous junction, which is the exit of the terminal fibers of the pudic nerve, the filaments being numerous. The pain and other symptoms occur during or after defecation. General ill-health, nervous exhaustion and chronic toxemia may and often do result from these lesions. Associated frequently with the condition is sphincterismus, a spasm of the sphincter ani muscle.

Treatment involves regulation of any existing constipation by means of a vegetable laxative, preferably cascara, the use of normal saline enemata and a non-irritating diet; for severe cases rest in a horizontal position. Palliative measures should always be first tried, consisting of suppositories and ointment in connection with the use of the sitz bath at 75° F. for fifteen to twenty minutes. Where the patient is suffering a great deal of pain, apply fomentations to the perineum and nates at a temperature of 130° to 160° F. for ten to fifteen minutes, followed by the foot-bath at a temperature as hot as can be borne. These two treatments are in turn to be followed by the application of the ice-bag to the anal region. In several cases the author has seen great comfort result from the perineal douche applied to the perineum and anal region at a temperature of 110° to 120° F. for one to two minutes. Where this cannot be obtained, the hot sitz bath at the same temperature for ten to fifteen

minutes will oftentimes prove effective. After a reasonable length of time, should these methods fail, recourse must be had to surgery. Immediately after the sphincter is dilated the fomentation should be applied; it is almost a specific in relieving pain and soreness.

Rectal Prolapse.

Prolapsus, or procidentia recti, is a protrusion through the anus of any part of the rectum, either mucous membrane or one or more coats of the bowel. The more the bowel is protruded the more the parts become stretched and relaxed, favoring its repetition. Bloody oozing, catarrhal ulceration and inflammation are frequent accompaniments. At first present only with stool and easily reduced, it may occur independent of fecal action. Where extensive it involves the peritoneum. Straining at stool, trauma, difficult urination and violent fits of coughing have been the causes of the disease. If the mucous membrane alone is involved, cure is often effected. It should be considered usually as a surgical affection; where surgery is declined treatment becomes palliative.

All causes that are likely to have produced the disease should be removed, the bowel returned to its proper position, if necessary replacing same by means of the genu-pectoral position. The bowel should then be retained in position by a compress and properly adjusted bands. The bowels are regulated by cascara, and defecation accomplished in a recumbent posture. An abdominal supporter will be found of considerable service, and gives a great deal of relief where the abdominal walls are pendulous. As far as possible, tone up the general health by using the electric light bath to the point of free perspiration, followed by the horizontal rain bath at 102° to 104° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure thirty pounds; reduce the temperature of cold water two degrees daily to 60° F.

Local measures will be found valuable, of which cold water enemata or ice-cones covered with iodoform gauze may be employed. The best local measure is the perineal douche applied to the perineum and anal region under strong pressure at a temperature of 60° to 50° F. for one-half to two minutes. It is astounding, sometimes, what excellent results will be obtained by these measures alone. In some cases where the prolapse is difficult of reduction, the patient should be placed in the genu-pectoral position and fomentations at 130° F. applied for five to ten minutes, followed by the use of the ice-cold compress. This method will usually enable the physician to promptly bring about reduction.

Hemorrhoids.

Hemorrhoids are vascular tumors of the mucous membrane of the rectum or anus, or both; in the external variety the skin alone

is involved. Internal piles of long standing may protrude at stool or on straining; may return spontaneously or have to be replaced; the mucous membrane may be excoriated or ulcerated. There is usually present pain, fullness, heat, tendency to strain, and pruritus. Hemorrhages occur from ulceration, etc. Modern civilization, with its strenuous life, lack of exercise, carelessness of the laws of Nature, constipation, or any condition that will prevent the return of blood from the hemorrhoidal veins, originates the disease. Uterine disease, the gravid uterus, growths of the liver, cirrhosis, enlarged prostate obstructing the return circulation, alcoholism, irregular habits as to stool, and hereditary disposition, all tend to their formation.

Immediately regulate the diet, eliminating alcohol, tobacco and condiments; hygiene must be established and moderate exercise prescribed. A saline cathartic should be given, and when catharsis has been produced a warm normal saline enema may be administered, followed by a cold one; should the hemorrhoids be inflamed, the fomentation at 130° to 150° F. for ten minutes, or the hot sitz at 110° to 115° F. for ten to fifteen minutes, followed by the application of a compress soaked in a lead and opium wash, upon which may be placed an ice-bag. The hot foot-bath will oftentimes materially aid. In a chronic case we should employ the electric light bath to the point of free perspiration, followed by the horizontal rain bath at 102° to 104° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure thirty pounds; reduce temperature two degrees daily to 60° F. Follow this treatment with the cold sitz bath at 65° to 55° F. for five to ten minutes, or the perineal douche applied to the anal region at 60° to 50° F., under as strong pressure as can be borne, for one-half to two minutes. The author prefers the use of the electric light bath, rain bath and perineal douche. The above treatment is purely palliative, permanent results being obtained by removal through operative interference.

CHAPTER XXV.

DISEASES OF THE SKIN, EYE AND EAR.

Urticaria.

Hives, or nettle-rash, is an inflammation of the skin characterized by wheals of a whitish, pinkish or reddish color, accompanied by stinging, prickly sensations, and associated with gastro intestinal symptoms. It is a cutaneous irritation due to some indiscretion in diet, or to some peculiar effect of certain substances, such as fish, crabs, lobsters, strawberries, etc. It arises from irritation from hepatic, renal, uterine or bladder derangements, neurotic conditions, pregnancy, lactation, menopause, etc. It is an acute edematous condition of the papillary layer of the skin, characterized by the development of wheals, which consist of circumscribed collections of semi-fluid material, the result of rapid exudation into the upper layers of the skin. These wheals may appear upon any portion of the body, their size varying from a pea to that of an egg. They may be so numerous as to cover the whole body; their size, shape and color vary. Acute attacks respond readily to treatment, but recurrence is very common.

In the acute stage the best procedure is to immediately wash the stomach, leaving therein a large dose of Rochelle, Epsom or Crab Orchard salts. This should be supplemented by the use of a hot saline enema and intestinal antiseptics. In some instances the general hot bath or the rain bath will give immediate relief, and in others it will be necesary to use the cold sponge at 60° to 50° F., applying cooling compresses especially to the irritated areas. Some cases are much benefited by a *very hot* alkaline sponge at a temperature of 130° F., in the water of which bicarbonate of soda, a drachm to the pint, has been dissolved. By far the best method of treating the condition is the use of the neutral bath at 90° to 92° F. for twenty to sixty minutes. This bath seems to have the property of immediately relieving the irritation and sedating the nervous system. Every endeavor is to be made to correct the patient's method of living and to stimulate the excretory and eliminating organs to the utmost. This is best accomplished by the following treatment: Electric light bath to free perspiration, followed by the horizontal rain bath at 104° to 105° F. for one minute, reduced to 65° F. for one-fourth minute, pressure thirty pounds, immediately followed by the jet douche to the spine at 65° F., pressure thirty pounds.

Angioneurotic edema is a neurotic condition in which edematous circumscribed swellings appear on the skin, sometimes on the mucous membranes, which disappear after a variable period without leaving behind any alteration in structure. It is a vasomotor neurosis, and oftentimes arises without apparent cause. In the greater number of cases seen by the author the handling of ice or cold objects provoked an attack. Certain drugs are said to produce it. Recurrences are very frequent, and when the larynx is involved the case may assume a grave aspect. The treatment is the same as above outlined for urticaria. Especial care must be exercised to build up the general health and train the vasomotor mechanism to stand cold water. When this is accomplished the area of sensitiveness is so reduced that the control of the disorder is usually complete.

Eczema.

Eczema is a non-contagious inflammation of the skin, characterized by any or all the results of inflammation. These results may occur at once or in succession, as erythema, papules, vesicles or pustules; may be accompanied by more or less inflammation and itching, and may terminate in serous discharge with the formation of crusts or in desquamation. It may be acute, subacute or chronic. Eczema attacks the rich and poor, the infant and aged, males and females. Many families are especially liable to its development, though the most common predisposing causes are improper food, diseases of the gastro-intestinal tract, imperfect elimination of waste material, deficient urinary secretion, Bright's disease, diabetes, functional and organic nervous affections, rheumatic and gouty diatheses, contact with poison ivy, heat and cold, and certain chemical and mechanical irritants. Eczema is a dermatitis with serous exudation. There is first hyperemia or congestion of the skin, followed by serous exudation. It is the most common of all the cutaneous affections, varying in accordance with the peculiar location, although the eruptions present all the characteristics of an inflammation, namely, redness, heat, swelling followed by a discharge, accompanied by itching and burning, varying from simple annoyance to a condition almost unendurable. It occurs most frequently on the face, back of the neck and genitalia. When occurring at the flexures of the body the skin is liable to become fissured, especially in those regions subjected to constant motion.

There is no specific, but the physician must search carefully for all conditions that are likely to produce the disease or undermine the general health. The diet should be carefully supervised, and alcohol, tea, coffee, candies, pastries, pickles, starchy foods and condiments positively forbidden. Fresh air and moderate exercise are valuable; the bowel regulated with cascara; water drunk freely and the renal secretions stimulated. General hydrotherapy will be valuable

in some cases in order to overcome the extreme toxemia that is present. In the author's experience the electric light bath to the point of moderate perspiration, followed by the rain bath at 102° to 104° F. for one or two minutes reduced to 75° F. for one-fourth minute, is the best method. Where there are many scales or scabs they may be removed by soap and water, especially if they are chronic in character. When the lesions upon the skin have healed we may begin decreasing the temperature of the cold water two degrees daily until 60° F. is reached. In the acute stage the cooling compress or the cool compress covered by Leiter's tubes will oftentimes give great relief to the patient. Hot-water drinking and the hot normal saline enema in toxic cases may materially aid in starting the patient on the road to recovery. It was in these stubborn cases, and especially where the irritation and itching were most unendurable, that Hebra obtained some of his most remarkable results by instituting the use of Reiss' neutral continuous bath, in which the patient remains indefinitely or during waking hours, the skin being anointed once daily with some lubricant.

In chronic eczema it has been the author's experience that the better the general health and elimination, the quicker the relief. Commence with the electric light bath to free perspiration, followed by the horizontal rain bath at a temperature of 102° to 104° F. for one to two minutes, pressure twenty pounds; reduce the temperature two degrees to 60° F. and increase the pressure one pound daily until thirty is registered. As soon as this point is reached institute the electric light bath to free perspiration, followed by the alternating or Scottish douche, using the jet and fan form as follows: Jet to the spine and fan to the body at 105° to 110° F. for ten seconds each, the jet to the spine and fan to the body at 60° F. for five seconds each, pressure thirty pounds; give four to six alternations. Where much suffering is present the local use of the fomentation at 130° F. for five to ten minutes will be found very beneficial. In this disease the hot springs of Arkansas, Virginia, Las Vegas, N. M., Rockbridge Alum Springs, Va., and Blue Lick Springs, Ky., have gained quite a little reputation. Chronic cases of eczema are successfully treated by means of the neutral continuous bath at Leukebad, Switzerland. Surf bathing, with the salines and mechanical friction, is valuable, both as a general and local measure. The water is a parasiticide of marked value.

Pemphigus.

Pemphigus is an inflammatory disease of the skin, either acute or chronic, and characterized by the development of a succession of round, irregularly-shaped blebs, varying in size. It usually originates from nervous prostration, general debility, disorders of menstrua-

tion, etc. It is much more frequent in the female sex, is sometimes hereditary, though in nearly all cases its origin is unknown. It is generally considered to be a trophoneurosis, the blebs being situated on the epidermis and arising from sudden effusion from the vessels of the corium. The contents of the blebs consist of yellowish serum of a neutral or alkaline reaction, that may after a while become puriform. The disease is a rare one, and the outlook uncertain. Most cases pursue a lingering, chronic course. Two cases in the author's practice recovered and have remained well for periods of six and eight years respectively.

The most important element is the reconstruction of the general health and restoration of the nervous system. This can best be accomplished by the combination of rest, tonics, nutritious food and hydrotherapy. As long as the blebs are present we should employ the neutral bath at 90° to 92° F. for twenty to sixty minutes once or twice daily. Hebra advises the continuous bath night and day until healing has taken place. The author has found in his very limited experience that as soon as the blebs disappear benefit will be obtained from the use of tonic hydrotherapy, provided the cutaneous stimulation is very mild. I have employed in these cases the electric light bath to point of perspiration, followed by the rain bath at 100° F. for one minute, reduced to 80° F. for one-fourth minute, and gradually reduced one degree daily to 70° F., below which it should rarely go. The pressure that is best maintained is ten to fifteen pounds.

Herpes Simplex.

Herpes, or "fever blisters," is an acute inflammation of the skin, characterized by the development of one or more clusters of vesicles, filled with a clear serum and occurring for the most part upon the face and genitalia. It is present most frequently during fevers, gastro-intestinal and nervous disorders. It may occur from friction and uncleanliness. The affection is usually neurotic in origin. Some authors believe it to be a toxic neuritis of a cutaneous nerve. The eruption is usually in the form of a cluster of vesicles containing a clear fluid, which dries up and forms brownish crusts, finally disappearing without leaving a scar. The most frequent places are the lips, ala of the nose, mucous membrane of the mouth, the tongue and prepuce.

Many cases require no treatment at all, but where the condition is troublesome and frequent we should, as far as possible, remove the cause, institute cleanliness and build up the general health. This can be best accomplished by the use of the electric light bath, hot-air bath or the superheated dry hot-air body apparatus, to free perspiration, followed by the horizontal rain bath at 101° to 102° F. for one to

two minutes, reduced to 65° F. for one-fourth minute, pressure twenty-five to thirty pounds, followed by the jet douche to the spine and the fan douche to the epigastrium for ten seconds at a temperature of 65° F. The home methods mentioned may be employed where access to institutions is impossible.

Herpes Zoster.

Shingles is an acute inflammatory disease, characterized by the development of firm, distended vesicles, situated upon inflamed bases corresponding to nerve distribution, and accompanied by more or less severe neuralgic-like pains. The eruption is the immediate result of the inflammation of the ganglia or the nerve trunks and branches of the trophic fibers of the affected area. Its origin is obscure; cold, injury, anemia and exposure have been assigned as the causes. The affection is characterized by neuralgic pains, followed by the appearance of papules and vesicles in the area of pain, situated on bright red, highly inflamed bases. They are about the size of pin-heads, usually discrete, greatly distended, and disappear at the end of the second week. The vesicles are well shaped and distended with a translucent, yellowish fluid. Recurrence is rare, and the case usually terminates in recovery.

In the early stage pain is best combated by the fomentation or hot compress at 130° to 160° F., followed, as suggested by Kellogg, by the neutral compress at 90° to 92° F., so applied as to exclude the air. Upon recovery general tonic measures should be instituted.

Acne.

Acne vulgaris is an inflammation, usually chronic, of the sebaceous glands of the skin, and characterized by the development of papules or pustules or the combination of such lesions, occurring for the most part on the face. The causes of acne are not, as a rule, well understood, but it occurs most frequently at puberty, especially where menstrual disturbances are present. Digestive disorders, constipation, anemia, chlorosis, sedentary lives, general debility and lack of muscular tone are all assigned as provocative agents. It may appear alone or be associated with comedo or seborrhea. It is an inflammation of the structures of the sebaceous glands and their surrounding tissue. The sebaceous secretions are first retained, as a result of which hyperemia and exudation into the gland wall and about the gland take place, with inflammation of the connective tissue followed by suppuration, which, if severe enough, destroys the gland, with a resulting cicatrix. The inflammation is usually of short duration, soon followed by pus, presenting the characteristic pin-head or pea-sized pointed papule, situated about the sebaceous follicles, with a minute central black point, the opening of the sebaceous duct. The lesions are unaccom-

panied with either local or constitutional symptoms. The forehead is the most common location. The disease is essentially chronic, and may last for years.

The most important element in the permanent relief of acne is building up the general health, and this is most rapidly accomplished by careful attention to the correction of digestive disturbances, constipation, and thorough elimination by the kidney. The diet should be restricted in that an excess of sugar, pastries and meats must be forbidden. Some cases cannot touch fried foods or greasy pork. Alcohol, tobacco, tea and coffee are best avoided, or the last two used with extreme moderation; exercise in the open air and abdominal massage are valuable; tonics should be prescribed. In the general reconstruction nothing equals hydrotherapy, as it relieves gastro-intestinal disturbances, increases the muscular tone, builds up nervous energy and favors elimination. It should be both general and local. Commence with the electric light bath, hot-air bath or superheated dry hot-air body apparatus, the first two to the point of profuse perspiration, and the last for thirty to sixty minutes, followed by the horizontal rain bath at 102° to 104° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure twenty-five to thirty pounds; reduce the cold water two degrees daily to 60° F., at which time add to the above treatment the jet douche to the spine for ten seconds and the fan douche to the body, especially the epigastrium, for ten seconds at 60° F. This treatment is the most effective that can be administerd, but where it cannot be carried out use the following: The full warm bath at 100° to 104° F., with friction applied by means of the flesh brush, for five to six minutes, this in its turn to be followed by the rapid cold sponge, commencing at 80° F., and reduced five degrees daily to 60°, making the sponge or towel wetter and wetter each application. Where it can be obtained, the hot bath above described should be given, followed by the shower at same temperature as the sponge.

The local treatment of acne has for its aim stimulation of the sebaceous follicles of the face and the prevention of the closure of the duct. Those that are already closed should be opened their contents expressed, or, where forming, expressed without puncture. As soon as this has been completed, green soap (saponis viridis) must be rubbed well into the skin and allowed to remain thereon for ten to fifteen minutes—some authors recommend all night—to be followed by the fomentation as hot as can be borne. The best time to make this application is bed-time, but should the green soap be allowed to remain upon the face all night the hot fomentation must be applied the next morning; it must be followed with cold water or the cold compress at 50° to 60° F. for one-half to one minute in order to prevent chapping or coryza. Surf bathing often cures the case.

Psoriasis.

Psoriasis is a chronic affection of the skin, characterized by reddish, more or less thick, elevated, dry, inflammatory, wrinkled patches, variable as to size, shape and number, and covered with whitish or grayish-colored scales. Its origin is unknown, but heredity, gout, rheumatism and some infectious diseases are supposed to cause it. It occurs in the robust and in the feeble, in both males and females, and is non-contagious. The disease is essentially a hyperplasia of the normal constituents of the Malpighian layer. It usually begins with reddish spots of the size of a pin-head, which become covered with scanty or abundant white or grayish scales. The spots gradually increase in diameter by peripheral extension, forming patches of various sizes and shapes. The skin between the patches is perfectly healthy. Any portion of the body is liable to be affected, but the elbows, knees and scalp are most frequently involved. The greatest discomfort experienced by the patient is an itching, which at times may be severe and distressing. The disease is essentially chronic; few cases are permanently cured, but improvement may take place for months at a time.

Improvement of the general health offers the best outlook, and to that end the correction of any constitutional tendency, the relief of digestive disturbances, regulation of diet and prevention of constipation may be expected to bring about beneficial results. Arsenic is valuable. The best result that the author has obtained in the treatment of this disease has been by the following method: The patient at the start is given the electric light bath to the point of free perspiration, followed by the neutral bath at 92° to 94° F. for twenty to forty minutes. The patient is gently dried and care taken to prevent coryza. As the patient improves cold applications are cautiously made, commencing with the cold sponge at 90° F., reducing one degree daily to 75° F., gradually making the sponge or towel wetter and wetter. At this point substitute the dripping sheet at 75° F. for three minutes, with vigorous friction, and reduce the temperature one degree daily to 65° F., at which time give the horizontal rain bath at 100° F. for one minute, reduced to 65° F. for one-fourth minute. We may now have recourse to the alternate or Scottish douche at a temperature of 100° to 104° F. for the hot and 60° F. for the cold, four to six alternations. The Scottish douche should be applied in the form of a jet to the spine and lower limbs and as a fan douche to the body.

Hebra and other skin specialists have recommended the continuous neutral bath, claiming excellent results, and for this reason, and because of other advantages, send their patients to Leukebad in Switzerland. The author's experience has been that while relapses occur where a thorough course of hydrotherapy is taken, the well interval

is longer. Sea bathing should be tried, not less than four to six weeks' course.

Dermatitis.

Dermatitis is an inflammation of the skin, the result of local irritation, and presents the usual phenomena of redness, heat, pain, swelling, tenderness and loss of function. Extreme cold (frost-bite), extreme heat (burns) and the solar rays (sunburn) are forms of dermatitis, and vary in many grades of severity from erythema and vesication to gangrene. Dermatitis may arise from poisonous plants, chemical irritants, from the handling of certain articles by individuals engaged in trades, from X-ray exposure, from drugs, from food and many other causes. The earliest manifestations are redness and a slight swelling, which may subside at this point, but if the irritant is continued the swelling becomes more intense, vesicles or blebs form on the affected region, accompanied by intense pain and itching. In a moderate degree the irritation usually subsides spontaneously, but may be prolonged by continued exposure.

Burns.

A burn is a severe grade of dermatitis resulting from the direct or indirect application of dry or moist heat to a portion of the cutaneous or mucous surface. Burns may be superficial (first degree), involve the entire epidermis and part of the true skin (second degree), or the deeper structures (third degree). Electricity and the X-rays produce severe and devitalizing burns. Shock varies, sometimes slight, sometimes alarming. The involvement of one-fourth to one-third of the body may result in death. Early mortality is due to shock; later, to infection from suppuration. Many complications may set in, of which meningitis, tetanus, bronchitis, pneumonia, inflammation of the gastro-intestinal mucosa, with the formation of ulcers, have been frequently observed. Deformities frequently result from scars.

In *dermatitis* the most satisfactory hydriatic application is the cold compress at 50° to 70° F., replaced every ten, fifteen to thirty minutes, or as often as it may become warm. The idea of this application is to repeat it frequently enough to prevent reaction and the secondary dilatation that follows. Where it is repeated sufficiently often it causes the constriction of surface blood-vessels, lowers the temperature, destroys sensation, abolishes reflex irritation and excludes the air. This treatment will be all that is necessary in the mild cases of dermatitis, severer conditions being met in the manner outlined for burns.

Burns are serious, especially if any great extent of surface is involved, and the aim should be to immediately check the inflammation, prevent sepsis, assist normal elimination of eschar, the development of granulations and limitation of deformity. Here, again, the cool

compress at 70° to 90° F., changed every ten to thirty minutes, or as often as warm, or the use of the compress and Leiter's tubes with water circulating at the same temperature, serve a useful purpose. Kellogg has suggested a similar method, called by him the "irrigation compress," which is nothing more or less than a compress upon which the water from 70° to 90° F. is allowed to constantly drip from a receptacle placed above the level of the part covered by the compress, the superfluous water being drained into a bucket by means of a rubber sheet placed under the part. Where the burns are very extensive and life is endangered, great care must be taken to keep the bowels open and the kidneys active. In this case hypodermoclysis at fairly frequent intervals is excellent, as it dilutes the toxins, prevents their absorption and favors elimination. Nothing approaches the use of the continuous neutral bath, either local or general, a method highly praised by Reiss and used with great frequency by Hebra.

The author shall never forget the impression made upon him in his observations in Vienna of the treatment of extensive burns by this method. For these cases Lucketad likewise has a high reputation, and it is certainly to be regretted that in this country the treatment is not more frequently employed, for it relieves pain and suffering, prevents absorption of a large amount of poison, keeps the surface clean, is as nearly aseptic as possible, stimulates renal activity and elimination. It is the *ideal* method of treatment. These cases should have applied to the uninjured skin surface, once daily, a coating of vaseline or some other ungeent.

Furuncle.

A boil is an acute affection of the skin, characterized by the occurrence of one or more circumscribed cutaneous or subcutaneous abscesses, which are usually terminated by necrosis of the central tissue, with subsequent evacuation in form of pus or a "core," and followed by the formation of a cicatrix. Boils usually result from inflammation of the hair follicles from infection by micro-organisms, though their occurrence is often associated with general debility, anemia, diabetes, uremia, uncleanliness, etc. A boil frequently commences in a sebaceous gland as a small, round spot, which gradually increases in size until a certain dimension is attained. When suppuration begins a core results, composed of the gland in which it originally started and the pus that has formed around it. This core, when thrown off, is composed of a whitish, tough mass of dead tissue, varying in size with the extent and depth of the inflammation. The staphylococcus pyogenes aureus is usually present. The abscess, as a rule, is small, round, highly inflamed and tender to pressure, with evidence of suppuration. Constitutional symptoms may be present according to the size of the lesion. Any portion of the body may be attacked, but

preference, however, is shown for the face, neck, back, axilla, nipples, etc. Boils may impair the general health greatly.

In the very early stage of the formation of the boil we may possibly be able to relieve the pain and abort its formation by stimulation of vital action. This can best be accomplished by the repeated application of the fomentation at 130° to 160° F. In the later stages, when suppuration has commenced, the fomentation will be found valuable in that it hastens pus formation and enables the core to be thrown off more easily. It should be here noted that when suppuration is present the fomentation should be applied for short periods of time only. Never use poultices, as they are unclean, sticky and inefficient in retaining heat. The fomentation is cleanly and antiseptic. As soon as pus forms the author believes that an incision should be made, followed by the use of the fomentation.

Carbuncle.

A carbuncle is an indurated, more or less circumscribed, dark red, painful, deep-seated inflammation of the skin and the subcutaneous connective tissue, terminating in a slough and the subsequent production of a permanent cicatrix. It occurs usually in middle-aged individuals and in men more frequently than in women. General ill-health, diabetes and local trauma predispose to the invasion of the micro-organism. The affection is usually manifested by a single lesion, which occurs with great frequency on the back of the neck, shoulders or between the scapulæ. It begins in the lower layers of the integument, first resembling a phlegmon, but is devoid of its red color. The area soon becomes a hard, circular, flat body raised above the surrounding parts, with painful infiltration of the skin and subcutaneous connective tissue, the size varying from a hazelnut to that of an orange; the color is violaceous, and after a week or ten days the pressure results in sloughing at numerous points, from which dead masses of tissue and pus are discharged. This gives the lesion its characteristic cribriform appearance. The final slough leaves a large, deep, open ulcer, with firm everted edges that granulate slowly and leave a permanent cicatrix. The prognosis is fairly grave if the patient is debilitated; general infection should always be borne in mind.

Carbuncle requires attention to all those measures that will build up the general health. Nutritious diet that is easily digested, regulation of the cloaca, rest and the internal administration of the tincture of the chloride of iron, together with quinine, arsenic and strychnia. The positive action of superheated dry hot air in this and the preceding affection is brought about by its destructive action upon the micro-organisms present, through the active hyperemia and leucocytosis induced, followed by a rise in the opsonic index; second-

artly, the skin is sterilized. My experience has been that local reinfection never occurred, that the general septic tendency was removed, while the pain was almost immediately assuaged by the sedative action of the heat and the relief in the tension of the infiltrated area.

In the very early stage of carbuncle the fomentation at 130° to 160° F., repeatedly applied, will, as in the case of furuncle, relieve pain and may abort its formation. Where this is unsuccessful and the carbuncle continues to progress, surgical measures should be instituted, an incision made, and the fomentation wrung out of a hot antiseptic solution applied for ten minutes and repeated for ten minutes at intervals of two to three hours. As soon as the local condition will permit, every effort must be made to build up the patient's general health and remove the underlying conditions. The author's experience, while limited, has taught him that the following method is by far the most satisfactory: After surgical measures have been instituted, the local superheated dry hot-air apparatus is used at a temperature ranging from 300° to 400° F. for one hour. This may be applied once, twice, or even three times daily, but experience has taught the fact that the application twice daily is sufficient. Three times a week the body apparatus at a temperature of 250° to 350° F. for one hour must be used to combat the general condition. During the existence of the carbuncle we may with advantage employ, between the applications of the superheated dry hot-air body apparatus, the cold sponge at 60° to 50° F., and as soon as the patient is up and the local lesion permits we may discontinue the local applications, give the body apparatus every day, and follow this with the rain bath at 75° F. for one-fourth to one-half minute. In a case recently under the author's care, a carbuncle located upon the forearm, there was entire subsidence of the condition in eight days, an unusual result in such an affection.

Comedo; Milium.

Black heads or "flesh worms" is a disorder of the sebaceous glands, characterized by the retention in the excretory duct of the inspissated secretion, which becomes visible above the surface as yellowish or whitish pin-head-sized elevations, containing in their centers blackish points. General low health, anemia, digestive disorders, constipation, menstrual disorders and urethral irritations are frequently back of the disease, though its exact etiology is unknown. The condition is brought about by an accumulation of sebum and epithelial cells in the glands and follicles, which dilate the duct so as to produce the point or elevation upon the surface. Comedo has a blackish appearance from the dust and dirt that has adhered to the surface of the elevation. They are most frequently observed upon the face, neck, chest and back, and are very disfiguring in appearance. There is, as a rule,

no evidence of inflammation, but the skin has a dirty, greasy, unwashed appearance. The disease usually takes a chronic course, though eventually relieved.

Milium is an accumulation of sebum in the sebaceous glands that are without excretory ducts, and is characterized by the formation of small, roundish, whitish, non-inflammatory elevations, situated immediately beneath the epidermis. Its origin is unknown, though the mechanism of its formation is the prevention of the escape of sebum. Milia may occur upon any portion of the body, but it is usually situated upon the face, forehead and about the eyes. They are about the size of millet seeds, are usually round in shape, giving the sensation to the touch of a hard body embedded in the skin. They are best removed by opening the cyst with a fine-pointed bistoury.

The treatment of comedo and milium should consist in the careful regulation of the diet, forbidding all pickles, pastries, sweets, and the administration of laxatives and tonics. Moderate exercise is to be prescribed; general measures to tone up the system and remove the underlying conditions are essential. The electric light bath or the superheated dry hot-air body apparatus will be found excellent measures, to be followed by the horizontal rain bath at 100° to 102° F. for one to two minutes, reduced to 65° F. for one-fourth minute.

The local treatment is best applied as follows: Compress or the fomentation at 125° to 130° F., or as hot as can be borne, is applied to the area affected, after which green soap (sapone viridis) is applied with massage, allowed to remain on fifteen to thirty minutes, washed off, the face dried, and the comedones then pressed out by means of a watch key or special instrument. The fomentation is then reapplied for five minutes, repeated for five minutes, and the treatment finished by a cold application for one-half to one minute.

Alopecia; Alopecia Areata.

Baldness is a loss of hair, which may be either partial or complete, congenital or acquired, idiopathic or symptomatic. The most common form is the symptomatic one, which results from infectious fevers, parasitic diseases of the skin, eczema, seborrhea, syphilis, lupus, etc. In the congenital, senile and idiopathic varieties the hair seldom regenerates, but in the symptomatic variety the possibility of a new growth or return of hair is directly in proportion as the cause is removable.

Alopecia areata is baldness in circumscribed areas; these areas occasionally coalesce, producing general baldness. Most cases are due to disturbances of the nerves, while others may be of parasitic origin. The condition is one of atrophy, and affects the hair and adjacent skin, the most common seats of the disease being the scalp,

beard, eye-brows, eye-lashes, and occasionally the pubic hair. The patches are usually round, circumscribed, smooth and white, with very few prominent follicles or broken-off hairs. The onset may be sudden or gradual and the duration indefinite. Some cases date their origin, as two under the author's care, from a sudden and profound emotion. The course is chronic, and usually requires a period of months to bring about recovery. Recovery in children is the rule. In older persons the general health must be corrected, after which the hair usually returns, provided a protracted course of treatment is followed. Relapses are common.

The most important element in the treatment of these cases is the reconstruction of the general health, and it has been the author's experience that without this little if any good can be accomplished by other measures. Every form of functional disorder should be sought and corrected, and especially those in the hemic, digestive, secretory and excretory organs. The diet must be nutritious and liberal, with moderate exercise in the fresh air and regulation of the bowel. The most satisfactory general method that can be adopted is that of the electric light bath to free perspiration, followed by the rain bath at 100° to 104° F. for one to one and one-half minutes, reduced to 80° F. for one-fourth minute, pressure twenty pounds; reduce cold water two degrees daily to 60° F. and increase the pressure one pound until thirty is registered. At this point add to the above treatment the jet douche at 60° F. for ten seconds, applied to the spine, and the fan douche at the same temperature to the trunk for ten seconds, taking special pains to make the latter application strong over the abdominal region.

Of local measures, the application of cold water (60° to 50° F.) in the shape of a shampoo, once or twice daily, followed by vigorous rubbing or massage of the scalp, will be found beneficial. If the disease is parasitic, an antiseptic or parasiticide may be added to the water. Some authors speak very highly of the stimulating compress at 60° to 50° F. applied to the scalp, but the use of this compress by the method suggested by Kellogg[1] has, in the author's experience, been by far the best. A cheese-cloth compress, wet in very cold water, is applied to the head after the hair and scalp have been thoroughly wet in cold water and shampooed, over which a rubber cap (like a lady's bathing-cap) is then placed, thus covering the compress. By retaining the heat the compress soon warms and develops the usual effects of such an application. Where baldness is partial and the remainder of the scalp is covered with a healthy growth of hair, simple wetting and covering with a rubber cap is sufficient to develop the full effects.

It will be observed at once that this is a nice way of applying the stimulating compress. The author would like to call attention to the

1 Kellogg, J. H.: "Modern Hydrotherapy."

fact that the rubber cap should not fit so tightly as to in any wise compress the skin of the scalp and interfere with the circulation of the blood therein.

Hyperidrosis.

Hyperidrosis is a disorder of the sweat-glands, characterized by an increased secretion of sweat, which may be either general or partial, unilateral or bilateral. It is usually brought about by some disorder of the sympathetic nervous system, although in some cases it is inherited. Its origin is unknown, but the condition is functional in character. The author has seen quite a good many cases associated with neurasthenia. The disorder may be acute or chronic, constant or paroxysmal, and the quantity of sweat small or large. Localized sweatings have occurred most frequently in the author's experience, upon the hands, the feet and face, in the order named. I have had half a dozen interesting cases of unilateral facial hyperidrosis. Where it occurs upon the palms it may be so profuse as to keep the skin of the hands constantly soft and prevent the sufferer from wearing gloves. This condition is very common in alcoholics.

Hyperidrosis of the soles of the feet is a disagreeable and distressing condition, as the shoes and socks become saturated with perspiration, and as it cannot evaporate rapidly through the leather nor be wiped off, the epidermis macerates and the skin becomes tender, causing much pain and distress. The maceration of the epidermis and the retention of the secretion from the toes produces a most disagreeable, persistent and disgusting odor, which oftentimes prevents the individual from seeking the society of his fellows. It is equally true of hyperidrosis of the genitalia. These cases are, as a rule, intractable and difficult of cure. Relapses occur with great frequency.

In a somewhat extended experience in the management of these local manifestations of nervous disorder, the author has found that powerful hydriatic applications in the form of general treatment, together with localized applications, will generally prove to be satisfactory, but time is required to overcome the different disorders of the system that underlie the neurosis. Commence with the electric light bath or the hot-air bath to the point of free perspiration, or the superheated dry hot-air body apparatus for thirty to sixty minutes. Follow this with the horizontal rain bath at 100° to 102° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure thirty pounds; reduce the cold water two degrees daily to 60° F. As soon as this lower temperature has been reached give the following: Electric light bath and rain bath as above, followed by the jet douche to the spine and posterior aspect of the lower limbs at 60° F., pressure thirty pounds, for ten seconds, and the fan douche at the same temperature to the body, especially the abdomen, as strong

as can be borne, for ten seconds. As soon as the patient stands this treatment well we may give the following, which should never be administered to a weak patient or to those who are slow in reacting: Electric light bath to free perspiration, followed by the Scottish or alternating douche at 102° to 105° F., applied in the shape of a jet douche to the spine and a fan to the body for one-fourth to one-half minute, alternating in the same manner with a temperature of 60° F., five seconds to the spine and five seconds to the body, four to six alternations. The termination of this treatment should always be the fan douche to the body, or, what is better, terminate the treatment with this douche applied to the upper surfaces and soles of the feet. The author has, however, found that *the best method* is to use the Scottish or alternating douche as above described and the alternate hot and cold foot-bath as a finishing treatment, or the simple cold foot-bath at 60° to 50° F. one-fourth to one minute. This treatment should be administered during the day and the patient instructed to bathe the parts with certain astringent lotions at bedtime. To the feet we should apply a strong solution of permanganate of potash, drachms one or two to the pint of water; to the face and hands a strong solution of tannic acid.

Anidrosis.

Anidrosis is a functional disorder of the sweat-glands of the skin, characterized by diminished or insufficient secretion of perspiration. Some skins naturally do not secrete a sufficiency of perspiration, and this may be a family trait. It oftentimes accompanies nerve injuries, but has, in the author's experience, been most commonly found where the general health is impaired, and especially in those diseases in which the digestive and renal systems were at fault. It is a disorder that may cause a great deal of suffering in hot weather, and in a certain sense subjects the sufferer to insolation. It has been the author's experience that where it is not due to a congenital deficiency of the sweat-glands or to irremediable nerve influences, it is generally more easily treated and more satisfactory results obtained than in hyperidrosis.

The important element, of course, should be to correct all those conditions or factors that are producing or aggravating the condition, and institute treatment that will stimulate the activity of the skin and sweat-glands. The patient should be instructed in hygienic laws, digestive disorders corrected, constipation overcome, and renal and cutaneous activity stimulated by the frequent ingestion of water. Hot procedures are of benefit in these conditions, and the Turkish bath has gained quite a reputation with these sufferers. We may administer the electric light bath or hot-air bath to the point of free perspiration; the superheated dry hot-air body apparatus at 250° to 300° F. for thirty to sixty minutes; the hot full bath at 100° to

105° F., or even 110° F., if possible, for five to ten minutes; or the full wet pack at 65° F. for one hour. The aim of these measures is to dilate the blood-vessels, stimulate the glands and increase the secretion of perspiration. Tonic reaction, by means of which the blood is retained in the skin and glandular activity stimulated, can only be brought about by following the heating procedure by cold applications. Selecting any of the foregoing, we may follow the application with the dripping sheet at 60° to 50° F. for three minutes, with vigorous friction, the half bath at 65° to 60° F. for two to five minutes, in conjunction with the affusion to the body; the horizontal rain bath at 65° F. for one-fourth minute, pressure thirty pounds; or the jet douche to the spine and fan douche to the body, especially the abdomen, at 60° F. for ten to twenty seconds, pressure thirty pounds. In some cases, as an after-treatment, it will be found beneficial to give short rubbings or friction, using at the same time cocoa-nut oil. This will tend to prevent the skin from becoming dry and harsh in the intervals between treatments until full effects are obtained.

Sudamina; Miliaria.

Sudamina is a non-inflammatory affection of the sweat-glands, characterized by the development of millet-seed-sized, translucent, whitish vesicles in great number upon any portion of the body. The usual cause of the disorder is high bodily temperature, causing unusual activity of the sudoriparous glands, which are excited beyond their capacity for normal secretion; the excessive fluid, instead of escaping upon the surface, collects between the layers of the epidermis in the form of minute translucent vesicles. It is a short-lived rash, the vesicles of which are distinct and resemble in appearance drops of free sweat; they never become purulent. The fluid is, as a rule, rapidly dissipated and the vesicles dry, leaving membranes which desquamate without scar.

Miliaria, or "prickly heat," is an acute inflammation of the sweat-glands, characterized by the development of reddish, pin-point- or millet-sized papules, vesicles or vesico-papules, accompanied by prickling, tingling and burning sensations of a most aggravated character, often associated with more or less malaise. Excessive heat or the retention of heat by tightly-fitting clothing, or high external temperature usually produces the eruption. The affection is most common in fleshy adults who perspire freely and in young children whose skins are exceedingly sensitive. Neurasthenia, digestive disorders and general debility favor the eruption. It is an inflammatory affection due to an excessive discharge from the sweat-glands, which develop vesicles and papules about the orifices of the excretory ducts in the skin. Hyperæmia of the vascular plexus of the sweat-glands occurs, followed by exudation and elevation of the vesicle, which may remain until

the irritation has been removed, when the eruption rapidly subsides. Heat rash or prickly heat is of sudden onset, and is usually a most disagreeable and distressing affection. It occurs most frequently on the abdomen, chest, back, neck and arms. In children it is usually accompanied by a state of great irritability. It may occur and disappear within a few hours, but in those who are predisposed it usually continues in different degrees during the summer heat. In the fleshy and in those who eat much meat the disease may be continuous.

The ideal treatment would, of course, be removal to a temperature sufficiently cool to prevent an occurrence of the eruption, but where this is impossible the patient should be kept cool and avoid exertion, meat and condiments. They should be instructed to drink freely of water, plain or carbonated, to which potassium citrate or bitartrate has been added. Sometimes the use of large doses of an saline cathartic will remove the irritation. The best general method of treating this affection is the use of the full neutral bath at 90° to 92° F. for twenty to sixty minutes, once, twice or three times daily if necessary. The local application of the cold or cooling compress or the sponge with alkaline solutions at 60° to 50° F. will give temporary relief.

Few physicians understand the hydriatic method by which we may keep *cool in summer*, especially at night. Those who are compelled to remain in heated districts, especially the urban population, can by the use of simple hydrotherapy secure a good night's rest and relief from the disagreeable effects of the heated term. It should be borne in mind that cold baths are tonic, stimulating, and in their application heat is produced as a result of its influence upon the circulation, metabolism and the thermogenetic centers in the central nervous system, for the sudden application of cold stimulates these centers to greater activity, and at the same time causes redistribution of the surface blood. If we wish to reduce the temperature by cold methods we must utilize the *brand* bath—that is to say, the full cold bath with friction. In the heated season there is nerve exhaustion, lack of physical capacity and an irritation that demands soothing applications, and nothing that will stimulate or increase the heat. It was the English who long ago found that in the heated and humid climate of India those who bathed in a tepid or neutral temperature remained in a better condition to "stand the climate" than those who used cold baths. The aim should be to prevent heat formation, and to this end we may use the following method: The tub is filled with water at a temperature of 90° to 96° F.—that is to say, a neutral temperature—in which the individual should remain from ten to thirty minutes. Where it is taken in the morning the person may dry himself with little or no friction, and endeavor thereafter to avoid muscular exertion. At bedtime, however, the person should, upon stepping from the bath,

put on a night dress, preferably linen, *without removing any of the surplus water*. In this way the night dress becomes moistened to a moderate degree, encasing the individual in a mild moist pack, which cools the surface continually by slow evaporation. If desired, the lounge or bed may be likewise sprinkled, and should the individual awake during the night a redampening of the night dress will oftentimes be all that is necessary to secure continued relief from heat. Should a draught be present, care must be taken to avoid being in its direct path, but usually where this is present the bath is not needed.

Seborrhea.

Seborrhea is a functional disorder of the sebaceous glands of the skin, characterized by excessive, diminished or abnormal secretion of sebaceous matter, forming upon the skin a coating, crust or scale. The origin of the disease is, as a rule, not known, but it occurs with a great degree of frequency in those who are anemic. It is a functional disorder that may terminate in atrophy of the glands. It occurs most frequently upon the scalp and face, appearing as a greasy coating upon the skin, unattended with itching. This secretion is sometimes so great as to collect in minute drops of yellowish fluid. It affects the face most frequently, and is usually worse about the nose. In some instances there is a more or less greasy mass of scales or crusts of a grayish or brownish-yellow color, which stick to the skin and itch moderately. Seborrhea of the scalp oftentimes causes falling of the hair and even premature baldness. Recovery is usually made from this affection, although it is slow. Especial attention should be paid to the variety that affects the scalp.

Here, again, the general health is what demands the greatest share of our attention. Disorders of the blood, digestion and elimination must be corrected, together with the prevention of intestinal toxemia, before success will crown our efforts. Regulate the hygienic side of life, correct underlying factors, better the blood and circulation, and a step will have been taken which frequently of itself is sufficient to cure the disorder. Hydrotherapy, by restoring normal circulation, bettering innervation and improving secretion, is a method that will give excellent results in seborrhea. The electric light bath is by far the best measure, followed by the rain bath at 102° to 104° F. for one to two minutes, reduced to 80° F. for one-fourth minute, pressure thirty pounds; reduce the temperature of the cold water two degrees daily to 60° F. As soon as this temperature has been reached add to the above treatment at 60° F., pressure twenty pounds, the jet douche to the spine and posterior aspect of the lower limbs and the fan douche to the body. This treatment should be combined with local cleansing measures and applications. The scales or crusts are first removed and then the scalp or the part affected treated by

means of the stimulating compress or cap, as suggested by Kellogg. Shampooing the affected area two or three times daily will oftentimes give great relief and relieve local manifestations.

Pruritis.

Pruritus is a functional disorder of the skin, characterized essentially by itching without any obvious cause. Sometimes it is idiopathic, but the greater number of cases are symptomatic and dependent upon general conditions. Idiopathic pruritus is oftentimes diagnosed, but it has been the author's experience that a careful and extended search of the particular case will usually detect the underlying conditions, the removal of which will remove the pruritus. (See "Pruritus Vulvæ.")

In the treatment of pruritus all underlying causes should be first removed and the treatment of pruritus itself modified to meet the condition found to be present. By far the best hydriatic method is the prolonged neutral bath at 92° to 94° F. for one hour, twice or three times daily. In two cases of general pruritus the author has been able to relieve the terrible suffering by means of the very hot fan douche at 105° to 110° F., if possible 115° F., for one to two minutes, applied to the entire cutaneous surface, reduced to 80° to 60° F. for one-fourth to one-half minute. This application was made during the daytime, and at bedtime the neutral bath for one hour was administered, together with free water-drinking; both cases recovered and have since remained well. Some writers speak highly of the action of the Nauheim or effervescing bath in pruritus, but of this the author has had little or no experience.

Bed-Sores.

A bed-sore is a lesion of the cutaneous surface that occurs in acute or chronic diseases from various causes, being especially prone to attack tissues whose nerve supply has been cut off. They are oftentimes a source of danger to the patient because of the infection that may occur and distress because of the discharge and pain. They can best be prevented by scrupulous cleanliness, the use of alternating hot and cold application several times daily, and the prevention of pressure. The thermic applications in alternation stimulate the circulation, improve nerve action and prevent infection. The application is best made by the alternating application of the compress wrung out of water at 130° to 160° F. and 60° to 50° F. It was in the treatment of burns and bed-sores that Reiss obtained his marvelous results in the use of the neutral continuous bath, and there is at the present day no method more satisfactory. The patient may remain in the bath during the day hours and at night be placed in bed. The skin must be annointed with an oleate once daily.

Cold Hands and Feet.

Habitual coldness of the hands and feet is an annoying symptom to a great many people who are out of health, who are anemic and nervously exhausted. In the treatment of the general condition from which they are suffering these local symptoms pass away, for, as a rule, the general tonic hydriatic measures instituted for the relief of the underlying cause will prove sufficient, but the conditions may be greatly benefited by the additional use of local applications. Many of these patients will be found to have disturbances of the sympathetic nervous system or some interference with their nutrition, as a result of which the extremities are reflexly cold. Many simple measures may be mentioned—the alternate hot and cold foot-bath, the former at 105° to 110° F. for one-fourth to one-half minute and the latter at 60° to 50° F. for ten to fifteen seconds, three to four alternations. In the same manner the alternating Scottish douche applied to the soles and upper surface of the feet at the same temperatures and durations as above will give, as a rule, very prompt results. Kellogg[1] recommends the cold douche to the palms of the hands and soles of the feet, where these are affected, at 60° to 50° F. for one-half to one minute and the cold compress or the alternating hot and cold compress where the face is the region affected. Those cases in which the sympathetic nervous system is involved should have the fomentation applied to the abdomen for ten minutes, followed by the trunk pack or abdominal compress at 65° F. for thirty to sixty minutes. The author has found that the foot-bath at 60° to 50° F., in which the temperature is maintained by constantly flowing water, is very effective, especially where we have to deal with cold feet alone. After these treatments the use of the oil rub accompanied by friction will be found serviceable and enhance the action of hydrotherapeutic measures.

Leprosy.

Leprosy, the "Unclean" of the Scripture, is a chronic, contagious and infectious disease produced by the bacillus leprae, characterized by the formation of new growths in the skin, peripheral nerves and internal viscera, producing various deformities and mutilations and usually ending fatally. It appears usually in two distinct forms, the nodular and anesthetic. Its period of incubation extends over a period of from a few weeks to many years. The ultimate physical condition of the unfortunate victim of leprosy cannot be equalled in any other disease. Lebair says if the patient does not die of some intercurrent disease or special complication, the unhappy leper becomes a terrible object to look upon. His deformed feminine face is covered with

1 Kellogg, J. H. Ibidem.
2 Quoted by G. Thin, "Leprosy," 1891.

tubercles, ulcers, cicatrices and crusts; his sunken, disfigured nose is reduced to a stump, his respiration is wheezy and difficult, he breathes with the greatest difficulty, loses his voice, his eyes and sight are destroyed. The patient suffers excruciating pains in his limbs, while the ravages of the diseases in his legs render walking difficult and even impossible. In spite of his condition, the unhappy leper, although in great prostration, commonly preserves his intelligence unaffected to the end.

In the anesthetic variety the bacilli are located chiefly in the neuroglia of the peripheral nerves. This form develops slowly, its average duration being estimated at about eighteen years. The lesions vary from the size of a fifty-cent piece to that of the palm or larger. They are usually reddish in color at first, changing to a yellowish, brownish or even darker shades. Their centers become depigmented and anesthetic, while the border may be hyperpigmented and hyperesthetic. Their commonest seats are usually the back, shoulders, face, arms, nates and around the knees. When the nerve trunks are the seat of severe neuritis they become much thickened and can be readily felt by the examining finger. Atrophic changes are first noticed in the interosseous muscles of the hand, the thenar and hypothenar being next involved, the atrophy extending thence up the arms, producing the "lepra claw." The same process may occur in the feet and the muscles of the face, making it expressionless. Perforating ulcers of the foot may occur and other trophic lesions.

Any method or measure that would aid or ameliorate such a heartrending condition is worthy of consideration and trial. The author has no personal experience and knowledge concerning the management of leprosy, but two recent communications upon the subject demand, in his opinion, consideration. Duque[a] says that the use of the red mangrove and the full hot bath is very beneficial. The mangrove, as prepared according to the formula of Dr. Moreira himself, is as follows:

Ground plant	1000 grams
Alcohol	200 "
Glycerine	350 "
Water	450 "

From which a dose should be taken in the morning and afternoon of one teaspoonful of the equivalent of seven grams; increase the dose every eight days by taking one teaspoonful more until eight, ten or twelve spoonfuls are taken at a dose.

The full bath should cover the entire body and be taken on going to bed at a temperature of from 39° to 40° Centigrade, or as hot as the patient is able to endure it. The duration ranges between fifteen and twenty minutes, care being taken that the temperature is main-

[a] Duque, Matias: "The Treatment of Leprosy," American Journal of Dermatology, 1902.

tained, that the body be immediately wiped and thoroughly dried without rubbing or friction whatsoever, and the patient retiring at once to bed, well wrapped. The bath is more efficacious if a decoction of the mangrove is added in sufficient quantity to redden the water used in the bath.

Hollmann[1] says that all lepers can take the medicated baths and be benefited, but the most improvement has been observed in those suffering from ulcerated tubercles and those who have thickened and lifeless skin, or where there are neuritic pains or the lepra itch. The plain warm full bath of soft water at a temperature of 95° to 104° F. assist the work of ameliorating the condition of the lepers by carrying off the effete material from the system and removing all crusts and scabs. The hot full bath at 105° to 110° F. is a powerful stimulant, and is usually succeeded by sleep in leprous patients. The medicated bath, of which he speaks in detail, is given at the above temperatures in a tub containing thirty to forty gallons of water, to which is added four gallons of the medicated mixture, which is made as follows: The leaves and tender sprouts of the eucalyptus, which are covered with water in a still, boiled for two hours and strained; add carbolic acid (1:4000) and sodium hyposulphite (1:50).

The bath is given twice daily. In the morning it should be at a temperature of 95° to 104° F., duration fifteen minutes. During the immersion active friction should be kept up on all parts of the body. Immediately after the bath the patient should be thoroughly rubbed with a towel coarse enough to give exercise to the skin. In the evening the bath should be at a temperature of 105° F., gradually raised to 110° F., or as hot as the patient can endure it. Its duration ranges from ten to fifteen minutes, at the end of which time the patient should be removed and wrapped in a warm blanket and allowed to remain thus covered for ten minutes.

Benefit has followed in nearly every case, only three out of four hundred cases being unbenefited. The author notes the following results: Cleanliness; when a person is afflicted with an incurable disease in a vast majority of cases he becomes more or less careless and neglects his daily bath. There is an absence of the peculiar odor and a lessening of the danger of contagion from attack. The glands of the skin are stimulated and goaded to a proper functional activity. The action is so great that patients have noticed a collection of effete material after the bath. It changes the appearance of the skin, which becomes clearer, cleaner, brighter and healthier looking. It softens the thickened, indurated and underlying integument, so that the skin becomes softer and more pliable, with a disappearance of some of the thickened ridges which cause the "leonine" facies. The stiffness and

[1] Hollmann, Harry T.: "The Use of Baths in the Treatment of Leprosy, Especially the Medicated Bath," New York Medical Journal, May 16, 1903.

contractures in the fingers are relieved as well as the neuritis. This intractable nerve pain is more relieved by the baths than from any drug internally. The itch disappears, excoriations, ulcerations, erosions and abrasions of the skin and mucous membrane are rapidly healed, while the leprous tubercles soften and gradually disappear; the insomnia is relieved. The reports from these observers should, at least, merit trial, and if found to be efficacious will be but another star in the broad firmament of hydrotherapy's many successes.

Skin Diseases in General.

In the hydrotherapeutic treatment of diseases of the skin other than those that have heretofore been detailed it may be stated in general terms, barring special cases, that *dry and scaly* eruptions demand treatment that will bring about more or less softening or maceration, which is best met by the non-irritating neutral bath at 90° to 92° F. for thirty to sixty minutes, to which an alkali has been added, the best being bicarbonate of soda, one drachm to the gallon. If the eruption is *moist, irritable and pruritic*, use a compress saturated in a cool or cold alkaline solution, or immersion in a cool alkaline bath at 75° F. for ten to twenty minutes, repeated once or twice daily. If the skin is being destroyed or damaged by pressure or irritation, either in whole or in part, we should use the neutral continuous bath of the whole body or of the part affected, as suggested by Reiss.

Eye and Ear.

The eye and ear are subject to certain inflammations, the result of infection, trauma or other irritation, and hydrotherapeutic applications may serve a useful though subsidiary part. In many instances they give prompt and satisfactory relief to pain and suffering, prevent the extension and further involvement of delicate and valuable structures, aid other measures and soothe the patient. The ophthalmic surgeon will find a useful ally in these simple but none the less valuable methods, and will doubtless find herein a field too little trodden save by the hydriatist.

If the *eyelids* are the only structures involved, and if the inflammation is acute, nothing equals the application of the cold compress at 60° to 50° F., renewed every twenty to thirty minutes, oftener in the very early stages, longer in the later stages as improvement takes place. The author has tried with considerable satisfaction in several cases the method suggested by Kellogg of a very gentle douche as hot as can be borne upon the external surface of the lids and forehead, it being equally valuable in acute and chronic inflammation of the lids. This treatment should be given twice daily where stimulation is needed, and be followed by the very brief cold compress for fifteen to thirty seconds at 50° to 40° F. Where the eyelid has

been subjected to trauma and where there is contusion, ecchymosis or subsequent irritation, resulting in a high degree of inflammation, accompanied by great pain, nothing will be found more soothing than the use of the very cold or ice compress. A block of ice is taken and several cheese cloths or linen compresses prepared. These are placed upon the block and when thoroughly chilled applied to the inflamed area. As soon as one compress begins to warm it is removed, another applied, the excess water squeezed out of the one removed and it again placed upon the block of ice. The compresses are thus applied in rotation and the cold application continuously maintained. The aim should be to obtain the contracting influence of low temperatures of cold upon the peripheral blood-vessels, its anesthetic influence upon the nerves, and its antiphlogistic action upon the tissue.

In ulcerations of the *cornea*, in inflammations of the cornea, in *degenerative states*, in *interstitial* and *phlyctenular keratitis*, infected *corneal wounds*, *hypopyon*, *suppurative panophthalmitis*, in *hyperemia*, in *muscular spasm*, in *iritis* and *cyclitis*, in injuries of the deeper structures of the *eyeball*, the most satisfactory application is the fomentation at 130° to 140° F., applied to the eye and forehead for ten minutes, repeated for ten minutes, followed by the cold stimulating compress for one or two hours, at the end of which time the fomentation may be repeated.

In *contusions*, commonly known as "black eye," the fomentation at 120° to 130° F. for ten minutes, repeated for ten minutes, followed by the stimulating compress at 60° to 50° F. for two to three hours, will generally relieve the condition and aid in removing some of the discoloration. The fomentation may be repeated every three hours, but should inflammation set up the compress should be changed every half hour and the method of fomentation and compress used every three hours.

In diseases of the *eye ball* of a painful and inflammatory character nothing is more satisfactory in their management than the application of the fomentation at 130° to 140° F. for two to five minutes, repeated three or four times and followed by frequent applications of the ice compress heretofore described in detail in this section. This method of treatment of changing the compress every few minutes and repeating the fomentation every two or three hours will bring about revulsive effects, by means of which congestion is relieved and pain mitigated.

In *asthenopia*, or irritable eye, the fomentation at 130° to 140° F. for five minutes, repeated for five minutes, followed by the cold compress wrung out of ice-water for one-half minute, repeated several times, will oftentimes relieve this most disagreeable and painful symptom.

In the *catarrh* that results from acute inflammation of the external

organ, or irritations and inflammations located in the external auditory canal; in *acute otitis media*, irrigation with normal saline solution at 100° to 120° F., followed by the compress as hot as can be borne, over which a hot-water bottle or Leiter's tubes are placed, with water circulating at a high temperature, will nearly always give relief and comfort to the patient.

In the use of heat and cold to the eye, it may be again stated that *cold* relieves pain, checks secretion, is germicidal and retards pus formation, while exercising an intense antiphlogistic influence upon these structures. *Heat* relieves pain, promotes reparative cellular activity, hastens absorption of exudates, is germicidal, and increases the local action of drugs. Heat should be first applied and the medicine then instilled. After prolonged (two to three hours) cold applications, their use should be intermitted, and brief hot applications made, in order that neural and circulatory activity, numbed and obtunded by the cold, may be roused to activity and the cycle of good effects re-established.

In all *chronic eye and ear* affections, improvement is often coincident with the improvement of general health, and for this reason general tonic hydrotherapy is indicated, in which the electric light bath, rain, shower, douches, etc., will be found useful. Sea air and sea bathing have often made a permanent cure, and should be more frequently recommended.

CHAPTER XXVI.

HYDROTHERAPY IN SURGERY.

Contusions.

A contusion or bruise is a subcutaneous laceration of the tissue due to the application of blunt force, without the skin above being injured, damaged or a surface breach occurring, an affusion of blood taking place in the tissue injured. Trauma of all kinds—blows, kicks, punches, etc.—produce the injury. The effusion of blood may be large or small, circumscribed or diffuse, the tissue vitality unimpaired or seriously devitalized; gangrene may result. Suppuration rarely occurs, and when it does is usually in a drunkard (see Alcoholism). Arrest of hemorrhage occurs from resistance of the tissue, contraction or retraction of the blood-vessels and coagulation. The fluid elements of the blood are soon absorbed, the red corpuscles break up, set free their pigment, which is carried from the seat of injury. The pigment may crystallize and remain in the tissues as hematoidin, staining them for months, sometimes for years. As the blood is absorbed it undergoes chemical changes, and the tissues may assume a red, purple, black, green, lemon or yellow color. This is seen typically in the "black eye." There is localized pain, tenderness, swelling and some numbness. The looser the tissue the greater the swelling and the deeper the discoloration. Severe contusion of vital structure is followed by considerable, sometimes grave, even fatal shock.

The first thing to be done is to relieve the shock, should it be present, and give the parts, as far as possible, functional rest. If in an extremity, this should be elevated, and in the early stage cold, in the shape of a compress at 60° to 50° F., applied and frequently repeated. If much shock and local depression of the vitality of the tissue is apparent, heat and stimulation are indicated. Taking the vast majority of contusions, the following treatment has, in the author's experience, proved very effective in promptly relieving pain, reducing swelling, favoring absorption and preventing too great discoloration. As soon as possible after the injury apply the fomentation at 130° to 160° F., or as hot as can possibly be borne, for ten minutes, and repeat for ten minutes. This is followed by the stimulating compress at 60° to 50° F., which is allowed to remain on until the next application of the fomentation, which in the early stage should be every hour, the time being lengthened as the swelling, pain,

etc., diminish. Richter[1] recommends the immersion of the part for one hour in very hot water (as hot as can be borne), made alkaline with natrium bicarbonate, stating that this method resembles greatly Bier's hyperemic method, but is much simpler and can be applied anywhere.

Sprains.

A sprain is a joint-wrench due to a sudden twist or traction, the ligaments being pulled upon or lacerated and the surrounding parts being more or less damaged. The knee, elbow and ankle are the joints most frequently involved. In a bad sprain the synovial membrane is contused or lacerated, the ligaments torn, the cartilages loosened or separated, muscles or tendons stretched, displaced or lacerated, vessels and nerves damaged and the skin often contused. Sprains are common in the young and in adults with weak muscles. They result from sudden twists or wrenches when the muscles are relaxed, the muscles being caught, as it were, unawares. A joint once sprained is liable to a repetition of the damage from slight force. The sprain is accompanied by pain and nausea, sometimes vomiting and syncope. Swelling, restricted movement, pain and tenderness are generally present. The usual time required for recovery (?) is six to eight weeks.

For the first few days where wrench has been very severe, functional rest and elevation of the parts must be secured. Where these conditions are treated in the home, the application of the local hot bath at 110° to 120° F., or as hot as can possibly be borne, or the fomentation at 140° to 160° F. for ten minutes, followed by the application of a firm and snugly fitting flannel bandage, will oftentimes give relief that is surprising. The author, however, has firmly settled convictions regarding the treatment of sprain, and he believes that nothing in the whole domain of medicine or surgery will give such satisfactory results as the application of the local superheated dry hot-air apparatus at temperatures ranging from 350° to 400° F. for one hour. The sprained joint should be properly covered with Turkish toweling, carefully placed in the local hot-air apparatus and the temperature rapidly raised to the point indicated. Treatment may be given once or twice daily, especially if the injury has occurred in a person whose extremities are thick. It is marvelous to see the almost instantaneous relief of pain that this high temperature brings about, and how quickly it removes the exudates, hastens repair and prevents the disability that would come from confinement to the chair or house.

In the very recent cases, where the injury is not severe and has only existed for four to six hours, the use of this measure once or

1 Münchener Med. Wochenschrift, LIII, No. 15.

twice daily will frequently enable the individual to be practically well in forty-eight hours. In other cases, after two or three days have elapsed, the treatment may require one to three weeks for a complete cure, although pain is promptly and satisfactorily relieved after several applications. In each instance the application of the dry hot air should be followed by the flannel bandage, snugly and firmly applied.

In chronic cases that have failed to be relieved, and whose joint is swollen, it will be almost surely cured (?), unless organic destruction has taken place, by the following satisfactory method: Local superheated dry hot air at 400° F. for one hour, followed by the Scottish or alternating douche applied to the joint at a temperature of 105° to 120° F. for one-fourth to one-half minute, pressure thirty pounds, alternated with a temperature of 60° to 50° F. for five to ten seconds, four to six alternations. In these chronic cases we frequently find that the general health has been more or less influenced by the local injury and shock sustained, and for this reason it is an excellent plan to administer the superheated dry hot-air body apparatus two to three times weekly at a temperature of 250° to 300° F. for one hour, followed by the horizontal rain bath at 75° F. for one-fourth minute. It should be noted that in this application no warm water is used in the rain bath. It will be found that after the application of the superheated dry hot air to the joint, massage, flexion and manipulation will materially aid in restoring function and activity to the parts. Some authors suggest that the hydriatic treatment should be followed by an oil rub and friction to the affected joint, but the author has never seen any special advantage derived from the use of unguents, the benefit derived being due to the massage and manipulations.

Dislocations.

A dislocation is the persistent separation from each other, partially or completely, of two articular surfaces. Dislocations may be traumatic, spontaneous or pathologic and congenital. They may be complete, partial, simple, compound or complicated. They are most common in the middle-aged, in males, in those who are engaged in severe muscular work, and in those joints that are ball and socket. External violence and muscular action are the most frequent causes. Pain, rigidity, deformity and change of bony relations are present.

The ideal method of setting a dislocation, of course, is the use of an anesthetic, by means of which complete relaxation of the parts is secured, pain and suffering avoided. In some cases, where cardiac disease is present, where the surgeon is unable to secure an anesthetic or where same is refused, we can frequently secure better results in replacements by first applying to the joint the fomentation at 130° to 160° F. for five minutes, repeated for five minutes; or we may place the patient in a full hot bath at a temperature

of 105° to 110° F. for five to ten minutes, at the end of which time in every case we may expect relaxation of the muscular tension at the joint that will permit of more satisfactory restoration of the dislocation. Where much injury has been done, and the part is very painful, it is a good plan to first secure rest of the part; apply thereon the ice-bag, which will assist in preventing inflammation, swelling, etc. If pain is present in a marked degree after functional restoration, the fomentation at 130° to 160° F. for ten minutes, repeated for ten minutes, followed by the stimulating compress at 50° to 40° F. for one-half to one hour, will, in a very short while, give relief to suffering. This treatment may be repeated, three to four times daily.

Fractures.

A fracture is the solution of continuity of a bone or cartilage by the application of sudden force. They may be simple, compound, comminuted, complicated, linear, green-stick, depressed, impacted, etc.

Bones are predisposed to fracture according to their shape, structure and position; by spinal or trophic diseases; by rickets, osteomalacia, etc. External violence, direct or indirect, is the usual exciting factor. Pain, deformity, loss of function of the part, motility and crepitus are usually present. Repair takes place in from four to six weeks.

As a rule, hydrotherapy can be of little service in the treatment of ordinary fracture, although the fomentation at 130° to 160° F., applied for ten minutes, will assist in relieving pain, relaxing muscular tension and stimulate vitality before applying the permanent dressing. In compound inoperable fractures nothing is equal to the use of the local continuous neutral immersion bath at a temperature of 94° to 92° F. This bath will allay inflammation, relieve pain, prevent sepsis and favor healing. It is the method *par excellence*.

Spinal Curvature.

This condition may present variations from the normal, anteriorly, posteriorly or laterally. It results usually from weak muscles and ligaments, by habitual assumption of unnatural and strained attitudes. It occurs most frequently in young girls at the age of puberty, when the bones are weak and the muscles soft. The weak muscles cease to sustain the spinal column and the ligaments stretch, relax or lengthen. Stooping is noticed; there is a weakness in the back, after a time pain; walking may be awkward and ungraceful; deformity is present; tenderness on pressure; the abdomen is protuberant and the chest flattened.

The important object in this disease is to restore muscular nutrition and overcome the deformity. To this end we prescribe proper clothing, free all constriction, avoid corsets, and instruct

the patient in gymnastics and deep breathing. Electricity and massage to the muscles involved are especially valuable. The patient must study improved methods in sitting and standing. Exercise should be insisted upon, of which golf, rowing, swimming and walking are valuable. In the general upbuilding of the system nothing is better than hydrotherapy, as it increases the muscular tone and circulation, energizes muscular tissues to action and develops their strength. These individuals are, as a rule, weak, nervous and irritable, and for that reason we should commence cautiously to develop their reactive capacity. At the start the cold sponge once daily at 85° F., followed by friction with a crash towel. Reduce the temperature two degrees daily to 75° F., at which time substitute for the sponge the dripping sheet at 75° F. for three minutes, likewise followed by vigorous friction and reaction; reduce the temperature two degrees daily to 60° F., at which point we may institute for a few days the following: Electric light bath just to the point of perspiration, followed by the half bath with friction to the parts immersed for one to two minutes, concluding the treatment with an affusion to the back and chest at 60° F. Now proceed to the following: Electric light bath to the point of perspiration, followed by the horizontal rain bath at 100° to 102° F. for one minute, pressure thirty pounds, followed by the jet douche to the spine and the fan douche to the body and abdomen at 60° F., pressure thirty pounds, for ten seconds each. As soon as the patient is able, give the following: Electric light bath to perspiration, followed by the Scottish or alternate jet douche to the spine and fan douche to the body for one-fourth to one-half minute at 102° to 105° F., first to the spine and then to the body, alternating in the same manner with a temperature of 60° F. for five to ten seconds, pressure thirty pounds. It is really at times astounding to note the changes that take place, not alone in the general health, but in the muscular structures of the body other than spinal, under the use of this powerful thermic and percutient measure. To those who have never experienced the stimulating and exhilarating influence of the jet douche to the spinal column, such effects come as a revelation.

Angular Curvature of the Spine; Pott's Disease; Spondylitis; Caries.

These conditions are usually due to tuberculosis, and occur most frequently in children who are predisposed to the disease. The dorso-lumbar region is most prone to suffer. The body of the vertebræ and the vertebral disks are destroyed; the weight of the spinal column resting on the softened bone causes it to crumble, compresses the diseased vertebræ, and angular deformity results. Caseation, pus formation or inflammatory organization may take place. In some cases the cord is compressed, either by the bone or by the inflammatory deposits.

Rest, immobility, nutritious diet and sea air are prominent

indications in these cases. Surgical measures should be at once instituted, by means of which the spinal column is straightened and functional rest given to the parts, preferably by fixation and the reclining position. A nutritious diet, in which the fats form an important element, is essential; tonics are indicated. The recent results obtained by treating bone tuberculosis at the sea-shore have shown that sea air is better than country or mountain atmospheres. Where this cannot be carried out, use surgical measures, and in addition the cold sponge at 90° F., reduced two degrees daily to 60° F., once or twice during the twenty-four hours. After the active process has subsided and the case enters the chronic stage, all those measures that have heretofore been noted under the head of tuberculosis should be instituted and the treatment persistently carried out. These embrace the dripping sheet, the electric light bath, the horizontal rain bath and the gentle jet douche to the spine.

Surgical Shock.

Shock is the sudden depression of the vital powers arising from injury, operation or profound emotion acting on the nervous system and inducing exhaustion or inhibition of the vasomotor mechanism. Blood pressure is lowered, cardiac action weakened, respiration impeded, with either collapse or a tendency to same. Death results from reflex inhibition of the pneumogastric nuclei and arrest of cardiac action. It occurs more frequently in women, in those who are weakened by suffering, in those who are fearful, in those who have diseases of the kidney, liver or heart, and who are alcoholics. Injuries to the spine, brain, nerves, testicles, thoracic and abdominal viscera produce extreme shock. Railway accidents, with their physical and psychic shock, are especially weakening. Chilling during an operation favors shock. Sudden and profuse hemorrhage, too rapid removal of the fluids from cavities, resulting in a sudden lessening of internal pressure by too rapid filling of the intra-abdominal veins, may cause it. The pulse is small, weak, compressible; temperature subnormal; skin cold, clammy and sweating; respiration shallow and irregular; mentality lessened; pupils dilated and sphincters relaxed.

Every effort should be made to stimulate the vitality, and to this end the patient is wrapped in blankets, heat applied by means of hot-water bottles, and if the case is severe a hot enema of normal saline solution or hypodermoclysis (500 to 1,000 c.c.), or both given. Lower the head of the bed and place an ice-bag to the heart over compress. The ice-bag must be removed at the end of twenty minutes, a fomentation applied at 130° to 140° F. for one or two minutes, and then replaced. Sometimes fomentations to the spine at 130° to 160° F., repeated every few minutes, will stimulate and arouse the nerve centers. Some authors state that abdominal

massage, by preventing the accumulation of blood in the viscera, will materially aid in restoring the circulation and overcoming the depression. Crile has found adrenalin chloride to be valuable. Nothing takes the place of the superheated dry hot-air body apparatus for the application of heat to the body surfaces, and this measure should and ought to be at hand in a surgical infirmary and operating-room, for the vitalizing effects of this application will more quickly, surely and certainly overcome the shock and depression than anything that the author knows, although his experience in this line has been extremely limited, though none the less gratifying. As soon as reaction takes place we should institute the sponge at 60° to 50° F., using a crash rag, taking especial care to have the room warm, exposing only one part of the body at a time, applying considerable friction during the cold application and rubbing the part afterward until thoroughly dry, red and warm. The ice-bag may be repeated every hour or oftener; the sponge every two or three hours. The method of sponging will have to be modified to suit the particular cause of the shock.

Hemorrhage.

Hemorrhage, or loss of blood, may arise from arteries, veins, capillaries, or from the three combined. It may be internal or external. Loss of half of the blood, four to six pounds, will usually cause death; women stand a larger loss than men. Old people, the very young, drunkards, and those suffering from nephritis, diabetes and sepsis, stand the loss of blood poorly. After much bleeding syncope occurs. Nature's effort by means of weak and feeble circulation to allow the formation of a clot. Vertigo, dimness of vision, roaring in the ears, great thirst, dilated, slowly-reacting pupils, shallow respiration, cold, clammy perspiration, subnormal temperature, muscular weakness and tremor usually occur.

The location of the hemorrhage will modify the method of treatment, as to whether it will be compression or ligation. Here again the use of heat in the shape of a dry hot blanket, together with the administration of the hot enema of normal saline solution, hypodermoclysis of normal saline and adrenalin chloride are indicated. Where the pulse is very strong and very active the hot water bag applied over the heart will reduce its force. Capillary oozing may be controlled by the very hot compress at 130° to 160° F., frequently repeated, for three to four minutes at the most. In order to control the hemorrhage by means of cold, we may use the cold compress, frequently repeated, or the compress over which is placed a coil of Leiter's tubes. Cold has a tendency to devitalize the tissues after hemorrhage when used in this manner. When reaction takes place cold should be applied to the head in the shape of a compress over which the ice-cap is placed. The fever that follows must be treated

as elsewhere indicated. Free drinking of ice-water, eating of small pieces of ice and the application of the cold sponge at 60° F., one to three times daily, will be found an efficient measure to control the condition.

Surgical Fever.

Genuine or true surgical fever is seen as the result of infected wounds where there is decided inflammation but no pus. This fever is caused by the presence of fermentative bacteria in the wound and the absorption of their toxic products, most commonly bacteria of a putrefactive type. Drainage relieves the fever, as a rule. There is chill, fever (101° to 103° F.), thirst, anorexia, nausea, coated tongue, constipation, scanty and high-colored urine. The wound is painful, tender, swollen, discolored and often foul. Pus may form, in which event the fever is due to the absorption of the toxins of pyogenic bacteria. Suppuration is prevented by the maintenance of nutrition, personal cleanliness, asepsis and antisepsis in surgical work.

The treatment to be instituted should not deter the surgeon from interfering surgically with the conditions present. Give sufficient quantities of saline laxatives to produce purgation, accompanied by free water-drinking to promote diuresis. The diet must be liquid and cold. To the parts involved the application of the cooling compress or the compress over which the ice-bag is placed, while at the same time a general cold sponge is administered, will frequently enable the patient to throw off the systemic and overcome the local effects. Where the case demands, hypodermoclysis of normal saline solution should be used. For weak heart use the compress and ice-bag to the precordium, interrupted every two or three hours by the fomentation for two to three minutes. Where it is desirable at any time to favor suppuration, the use of the fomentation every three hours at 130° to 160° F. for ten minutes, repeated for ten minutes and followed by the stimulating compress, will bring about the desired result. Kellogg recommends the use of the fomentation and the ice-cold compress alternately. They should be used continuously, commencing with the hot and always ending with the cold application. Nothing equals the action of the superheated dry hot-air local apparatus applied to the part involved. The action of this measure is to inhibit and destroy germ life; it neutralizes and consumes the toxins already formed, and prevents their formation; it enhances the vital and resistive power of the affected tissue, the line of demarcation being more quickly established; it favors destruction and throwing off of the dead and devitalized tissue; it increases granulation and healing, enhances circulation and repair of tissue by the blood-stream, relieves pain and promotes comfort. In a recent case of this character the author has had the pleasure of seeing the disease almost immediately stop and improvement take place within twenty-four hours.

Abdominal Surgery.

In those cases of abdominal section in which the necessity to operate is not urgent or imperative, the individual can be prepared and the vital resistance and power greatly enhanced by a general preparatory course in hydrotherapy. The measures hereinafter recommended, combined with suitable hygiene, diet and ordinary surgical preparation will so enormously increase the patient's power of resistance that many cases would sustain the operation more satisfactorily, recovering more promptly with fewer complications. The vast majority of these cases have had their general health and tone undermined by the toxic influences that are usually associated with their disease, their neural power weakened by pain, loss of rest and other nerve-racking conditions, so that they present a picture too familiar to all practitioners to go further into details. By its action hydrotherapy opens up the secretory structures of the skin and kidney, increases the activity of the heart and circulation, perfects oxidative processes, and by its powerful energizing influences upon the sympathetic and central nervous systems, betters digestion, increases absorption, overcomes toxemia and infuses a sense of well-being and strength. This is of advantage, as it robs the patient of the inherent terror of the anesthetic and the psychic depression that always accompanies major operations. The method should be employed for ten days or two weeks prior to the operation.

Start with the cold sponge in the morning, at mid-day and in the evening; commence with a temperature of 80° F., and reduce five degrees each application until 50° F. is reached, at the same time keeping the bowels open, having the patient drink freely of water, using the hot saline enema once daily and the vaginal douche when indicated twice daily. No meats or meat extracts should be allowed during this period. On the third day we may begin with the dripping sheet in the morning and evenings at 60° F. for three minutes, accompanied by vigorous friction, while the patient stands in a hot foot-bath, as hot as can be comfortably borne. Where the patient is up and able to go about we may then, at the end of two days of this treatment, institute the electric light bath or the hot-air bath to the point of profuse perspiration, or the superheated dry hot air body apparatus for thirty to sixty minutes at 250° to 300° F., or the full wet pack at 65° F. for one hour, followed by the horizontal rain bath at 100° F. for one to two minutes, reduced to 60° F. for one-fourth minute, pressure thirty pounds. Where the patient is confined to bed the use of the cold sponge in the morning, at mid-day and the trunk compress or the half wet pack at 65° F. in the evening, will be found an excellent method. Where certain parts are painful the fomentation at 130° to 160° F. may be administered once or twice daily, followed by the hot-water

bag to the parts so treated. Tonics should be given and opiates avoided.

During the anesthetic the heart may be energized by the use of the ice-bag applied to the precordium, this simple measure rendering, as the author has seen, valuable service in combating threatened cardiac weakness and failure. Many cases are benefited by hypodermoclysis of 500 to 1,000 c.c. of normal saline solution, the action being to remove the effects of the anesthetic, fill the blood-vessels, increase heart action and favor elimination, thus combating shock and collapse. Succeeding the removal of the anesthetic, if the pulse is bad, apply the ice-bag to the precordium for fifteen to twenty minutes every two hours, preceding it by a brief application of the fomentation. Repeat every one, three or four hours as needed. Vomiting may be relieved by lavage unless contraindicated, or the ice-bag applied to the epigastrium or spine opposite. The swallowing of small pieces of ice, a warm enema at 96° to 98° F. to favor elimination and kidney action, may always be used. Demoor[1] gives his patients some water just prior to operation, having found that patients swallow air, mucus and saliva charged with chloroform, which irritates the mucous membrane of the viscus and causes it to empty itself. The water prevents the vapor reaching the walls of the stomach. One and a half hours before the operation a "large" glass of water is given and repeated every half hour to time of operation, four glasses in all, amounting to about 1,000 c.c. This is especially valuable in surgical cases complicated by gastric disease, in which tenacious mucus is present in the stomach, and in whom vomiting may persist for days. Lavage before and at the termination of the operation, together with the use of the water as above mentioned, has given "excellent results." During the first few hours succeeding the operation no hydriatic measures should be instituted, but as soon as practicable we commence their use, for we can by this measure hasten the progress of convalescence. Nothing is superior to the cold sponge, accompanied by gentle friction, applied two or three times daily.

Synovitis, Acute and Chronic; Arthritis; Exudates in Joints; Adhesions of Joints; Contractures of the Joints.

Synovitis is a primary inflammation of the synovial membrane alone. Where other structures than the synovial membrane are involved the condition is then known as "arthritis," for the treatment of which the reader is referred to another section. The acute form usually results from overuse, twists, sprains, contusions, gonorrhœa, rheumatism, tuberculosis, and some believe from cold and damp. The synovial membrane is red, swollen, and the joint contains an excess of turbid, fibrinous material. Secondarily, arthritis may be produced.

[1] Gazette Hebdomadaire des Science Medicales de Bordeaux, 1896.

Pain in the joint, increased by pressure, movement and dependent positions; swelling, bulging, fever, and, if pus forms, rigors, septic temperature and local evidences of its formation. The knee is most commonly affected.

The usual method is rest and immobilization of the joint, and where it is indicated aspiration of any fluid that may be present. By far the best method of treating these cases is to immediately commence with the use of the superheated dry hot air local apparatus at 300° to 400° F. for one hour, its action being to relieve pain, hasten recovery and prevent ankylosis. It is common after the first treatment or two for the joint affected to feel worse for a few hours, a condition brought about by the unusual activity of the joint circulation. Where the condition is tubercular the use of this method is not contraindicated, but, on the contrary, the joint will, after a while, yield to the treatment; but should this fail and an operation become necessary, the individual stands a better chance of having the disease localized, and in this way making it easier for the surgeon to remove the focus of the infection. The author's experience has been that the cooling compress at 70° to 60° F., or the compress covered by the ice-bag to the parts affected, will, in the early stage, when the joint is swollen, hot and tender, prove effective in further relieving pain and stimulating recovery. If, however, suppuration has already started, the superheated dry hot air should be followed by the use of the stimulating compress at 65° F., or alternating compresses, hot and cold.

Chronic synovitis usually follows the acute, but may be chronic from the start. Many are in reality tuberculous. The joint may become swollen or dropsical—"hydrops articuli." The synovial membrane is much thickened and adherent in some places. Pain is present only on use or pressure; passive motion may develop crepitus; fluctuation is apparent and hypodermic needle aspiration will remove a viscid, straw-colored fluid.

In these old chronic joint diseases the author's experience has been considerable, and nothing, in his opinion, has yielded such excellent results as the superheated dry hot air local apparatus at a temperature of 300° to 400° F. for one hour, treatment daily. Some authors recommend the local electric light bath, which is beneficial, but possesses nothing like the power of the above method. Some advantage is to be obtained from the application at night of the stimulating compress at 60° to 50° F., well protected, and the firm pressure that can be obtained from a tightly fitting bandage. Hutchinson[1] has used with satisfaction a stimulating compress, or "salt pack," applied as follows: A piece of flannel adapted to the part is soaked in brine or saturated solution of salt and water (at 50° F.), wrapped around the

[1] J. Hutchinson, Jonathan, Polycrisis, 1882.

joint, covered with another piece of flannel, over which oil silk is bound by a roller bandage. The author can recommend this simple but useful method.

As progress is made and the condition justifies its use, we may have recourse to the Scotch or alternating jet douche to the joint at 110° to 120° F. for one-fourth to one-half minute, alternating with a temperature of 65° to 50° F. for five, ten or fifteen seconds, four alternations, finishing the treatment with the fan douche to the entire body at the lower temperature. The use of the superheated dry hot air and the Scottish douche has, in the author's experience, proven especially valuable in old joint troubles accompanied by exudation of any kind.

In addition, we may employ electricity to the joint, massage and passive motion, these being most effectively used immediately after the application of hot air. It is, of course, understood that surgical methods are to be coincidental with these treatments. Tuberculous joints are best treated both by the surgeon and the hydriatist rather than by either of them alone.

Ankylosis.

When a joint has been inflamed and the inflammation eventuates in the formation of new tissue in and about the joint, contraction of this tissue limits or destroys the mobility of the joint, producing the condition known as ankylosis, which may be either complete (bony) or incomplete (fibrous). It may be due to contraction of the structures of the joint itself or from contractures in the structures external to the joint. Any form of inflammation by which new tissue may be formed will produce the condition, be this wounds, contusions, sprains, dislocations, fractures, tubercle, gout, rheumatism or syphilis. Prolonged immobilization of a healthy joint will produce ankylosis with muscular atrophy, weakness, etc. It occurs more frequently in a hinge than ball and socket joint. Fibrous ankylosis, as a rule, follows aseptic inflammation; the bony, infections.

There is no question but what the application of superheated dry hot air in those diseases that cause ankylosis of the joints, by removing the exudate before it becomes organized and by limiting inflammation, would, as a rule, limit inflammation, lessen the deposit of lymph and prevent ankylosis. It is, therefore, the remedy *par excellence* as a preventative of this condition, and at the same time is the best method by means of which the exudate binding down the joint may be softened and finally removed, save in those cases where bony ankylosis has taken place. In these chronic cases nothing equals the combination of the superheated dry hot air local apparatus at 350° to 400° F. for one hour, followed by gentle passive motion for a few minutes, applying immediately thereafter the Scottish or

alternating douche at 110° to 120° F., or hotter if possible, for one-fourth to one-half minute, alternating with a temperature of 60° to 50° F. for ten to fifteen seconds, four to six alternations, and terminating with the general fan douche at a temperature of 60° F. to the entire body for five to ten seconds. In some cases, where the general health is involved, it will be found valuable to twice weekly substitute for the local the body apparatus, following it with the Scottish douche to the joint and the fan douche to the body as above described.

Ulcer.

An ulcer is a solution of the continuity of a superficial tissue, due to a loss of substance through molecular death. It is brought about by the action of micro-organisms, usually of the pus group, and bears a close analogy to an abscess. The floor of the ulcer is usually granulation tissue. It increases in size by molecular death of surrounding tissue; it heals by granulation, this being gradually converted into fibrous tissue, which, contracting, lessens the size of the cavity. When the granulations reach the level of the skin, the epithelium at the edges proliferate and cover the sore. It may result from inflammation, septic infection (bacterial), putrefactive bacteria in wounds, deficient blood supply, prolonged pressure, trauma, interference with the blood supply to or its return from a tissue, trophic disturbances, etc., but most commonly from pus organisms. Ulcers are acute or chronic. Their most common position is upon the leg.

In the management of chronic ulcer the first thing to be done is to administer a dose of calomel, followed by a saline, and direct the patient to avoid the use of meats and alcohol in any of its forms. The ulcer should then be cleaned thoroughly with peroxide of hydrogen, its edges clipped away and the surface sterilized with bichloride of mercury solution (1:1,000). The extremity is then placed in the superheated dry hot air local apparatus at 250° to 300° F. for one hour, followed by the application of the stimulating compress at 60° F., over which a firm bandage is applied every day, to or above the knee joint, with the idea of supporting the circulation. Some authors speak very highly of the local electric light bath, but the author has found the preceding method so satisfactory that he has not in recent years deviated from its use in the management of this disagreeable disease. These cases are nearly always toxic, run down in general health, and for that reason it is a good plan, twice or thrice weekly, to substitute for the local the body apparatus, raising the temperature 250° to 300° F. for thirty to sixty minutes. This treatment should, as a rule, be followed by the horizontal rain bath at 75° F. for one-fourth to one-half minute. In some forms of chronic ulcer, where the edges are hard and everted, where the vitality of the part is very low, it is an excellent plan to make first the application of the

superheated dry hot air, following this with the Scotch or alternating jet douche to the spine, at a temperature of 110° to 120° F., pressure thirty pounds, for one-fourth to one-half minute, and gently to the ulcerated surface, changing to a temperature of 60° to 50° F. for five to ten seconds. After the patient has been dried and reaction secured the ulcer may be dressed with bovinine and supported again by the application of a firm spiral reverse bandage. In acute ulcer Kaposi has found the prolonged neutral immersion bath at 92° to 94° F. for two to six hours to lessen the pain, lower the temperature, diminish congestion and favor healing, while Cushing suggests the use of local hypodermoclysis of normal saline solution to the ulcer itself.

The author can speak favorably in some cases of the static wave, negative galvanic and the high frequency electrical currents applied to the surfaces of the ulcer, in addition to the treatment with the superheated dry hot air.

Gangrene.

Gangrene, or mortification, is death in mass of a portion of the living body, large enough to be visible to the eye. It may occur from injury, either chemical or mechanical, heat or cold, bad health, circulatory obstruction, trophic and vasomotor nerve disturbance, or from microbic infection. The immediate or essential feature is that the tissues are shut off from their arterial blood supply, being thus robbed of the nourishment that supports cell nutrition.

The method herewith suggested for the treatment of gangrene may be used first in stimulating the circulation and vitality of the part to prevent and later to favor the line of demarcation between the gangrenous and healthy tissues. In gangrene, toxic and septic material of necessity enters the system, and for that reason the combined local and general method is the best. The superheated dry hot air local apparatus at 350° to 400° F. for one hour to the part affected three days in the week, and a general application of the body apparatus three days in the week, will go a long way towards building up the vitality and the general health of the patient, as well as the results above outlined, with the local condition. The general state of the patient will have to be carefully studied as to whether tonic measures such as the cold sponge shall be used, or whether we can employ the horizontal rain bath or other hydriatic measures.

Septic Infection.

Sepsis is a febrile malady due to the introduction into the blood of pyogenic organisms or their products, or of saprophytic bacteria. No one special micro-organism causes the condition, but any one that produces inflammation is sufficient. Septic intoxication (sapremia) results from absorption of the poisonous ptomaines from the putrefactive area. These toxins are small in amount, and in their toxic

actions resemble the alkaloids, in that small doses produce profound and widespread results.

The toxins of both the saprophytic and pyogenetic germs may be simultaneously absorbed. The condition may be slight or grave according to the dosage. Surgical fever is a mild form of septic intoxication. It may follow labor, abortion, amputation, from pent-up wounds. It means an ill-drained wound, a fermenting and putrid blood clot or wound fluid. In true septic infection the blood contains not alone the toxins, but pyogenic bacteria themselves. The tissues themselves are suppurating and toxins enter by the lymphatics. The symptoms depend on the dose. The blood is truly infective and capable of reproducing the disease. It may arise from some nidus of suppuration that has not been discovered, such as otitis media, suppuration of the tonsil, gonorrhea, etc. The germs are usually staphylococci and streptococci. There is fever, sweats, a small and weak pulse, that is frequent and compressible; the tongue is dry and brown, with a red tip; sordes on the teeth, prostration, perhaps low delirium. Visceral congestion, profound anemia and leucocytosis occur. The outlook in septic intoxication is good; in septic infection bad. There is danger of all forms of inflammatory complications of serous membranes. It may be local or general.

Septic infection occurs with a moderate degree of frequency today in spite of the most careful observance of aseptic and antiseptic technique. Prevention is, of course, the best method, but at times it is impossible of attainment.

The surgeon should first open and drain the nidus or the center of infection, and render it as far as possible antiseptic and sterile, at the same time administering salines to the point of free catharsis, and alkaline diuretics. Milk, milk and lime-water, peptonoids, etc., are indicated, as well as strychnia and digitalis. In these cases hypodermocylsis of normal saline solution is very valuable, in that it dilutes the poison, favors elimination, fills the blood-vessels and stimulates the heart, kidneys and skin. Where heart failure is present the compress and ice-bag to the precordium will be found most useful, but the best treatment is a combination of the local and general superheated dry hot air, giving the body apparatus at 300° to 400° F. for one hour daily, with one or two applications of the local apparatus at 350° to 400° F. for one hour to the local area of infection. The action of this agent upon saprophytic and pyogenic bacteria is destructive; it stimulates circulation, favors leucocytosis, arouses the trophic nerve centers, elevates the resisting powers of the tissues and burns up toxins. It relieves pain, provided there is drainage, and brings fresh reparative material to the part; lessens exudation and swelling; increases cellular activity; induces repair and prevents destruction.

From the beginning, before and soon after the onset of surgical

fever, we should institute those measures that will stimulate vital resistance. These cases demand, in addition to the superheated hot air, the sponge at 60° to 50° F., with friction, every two to four hours, as well as the use of compresses over the affected area. With a little care and judgment these measures may be adopted to almost any case.

Osteitis; Periosteitis; Osteoperiosteitis; Osteomyelitis.

The foregoing inflammatory group represents inflammations of the bone, periosteum, bone and periosteum, and bone and medulla respectively. They may be acute or chronic. They may be provoked by trauma, constitutional malalties or diatheses, extension of inflammation from other structures or from infection. Termination may be in resolution, sclerosis, suppuration or necrosis. Severe pain, worse at night, aggravated by dependent position; tenderness on pressure and percussion, swelling, discoloration and some fever are usually present. Many chronic forms are syphilitic. These are grave diseases, and their outcome uncertain. Many cases would in all probability be completely checked in the early stages by treatment, and those that were not would be better prepared for operative work were the measures herein suggested carried out.

All hygienic measures should be instituted and a generous and nutritious diet prescribed. The secretions and excretions should be stimulated, and the following method instituted: To the parts affected the superheated dry hot air local apparatus at 300° to 400° F., once or twice daily, depending upon the gravity of the case, and twice or three times weekly the body apparatus at 250° to 300° F. for one hour, or, what is far better, the daily use of the body and twice daily the use of the local apparatus, the latter morning and night and the former during the middle of the day. Tonic hydrotherapy should not be used at first in these cases, unless we use the cold sponge at 60° to 50° F. to those parts of the body not infected. As soon as the inflammatory trouble has begun to subside we may commence to build up the general health by diminishing the number of the applications of the superheated dry hot air to one daily, and following this with the horizontal rain bath at 100° to 102° F. for one minute, reduced to 60° F. for one-fourth minute, and later, if the patient can stand same, add to the above the jet douche to the spine at 60° for five to ten seconds.

Appendicitis.

It is generally admitted that the medical treatment of this disease is that of Dr. A. J. Ochsner, who has kindly prepared, at the author's request, a description of his method, and for which the author herewith expresses his appreciation:

"The method of treatment of acute appendicitis known as the

starvation method is applicable to a definite limited class of cases, namely, those of severe acute appendicitis usually of more than twenty-four hours' standing, with gangrene or perforation of the appendix, with a condition in which the infectious material has already extended beyond the tissues of the appendix.

"The treatment is applicable especially to cases that come under the physician's care on the third, fourth, fifth or sixth day of a severe acute attack—cases which were classified by Mynter as beginning diffuse peritonitis, and which have been classed by other authors as cases of spreading or advancing peritonitis due to a gangrenous or perforated appendix.

"The treatment is not intended for cases of acute appendicitis in which the infectious material is still confined to the appendix, because in these cases the results obtained from removing the appendix immediately are so excellent that nothing could be gained by substituting any other form of treatment, unless there were available no surgeon competent to safely perform any simple abdominal operation.

"The same is true concerning chronic appendicitis in the interval between acute attacks. For this limited class of cases, then, I have advised this definite method of treatment, which consists in the removal of all contents of the stomach by carefully performed lavage.

"For this purpose the patient is placed upon his right side, the pharynx is thoroughly sprayed with 2 per cent. cocaine, which is left in contact with the pharynx for a period of five to ten minutes, then a thoroughly oiled stomach-tube is passed into the stomach.

"Any fluid that may be present is permitted to drain off, then from one-half of a pint to one pint of warm normal salt solution is poured into the stomach. The solution should be at a temperature of 98° to 105° F. This solution is siphoned out again, and this repeated until the fluid returns perfectly clear; then the foot of the bed is elevated and the tube is withdrawn slowly so as to leave the stomach empty, the lower end of the bed being elevated while the tube is being removed in order that the siphonage may be continued while the tube is being withdrawn. It is important that the tube be withdrawn slowly in order that the fluid will be thoroughly removed. It is also important that gastric lavage be employed in every case in which nausea or vomiting is present.

"Many cases that have vomited repeatedly for a number of hours still carry in their stomachs from a few ounces to a quart of decomposed material. It is frequently thought that because the patient has vomited so constantly that his stomach cannot contain any more fluid, but experience has shown that precisely the opposite condition is true.

"There is in some cases regurgitation of intestinal contents from the intestines into the stomach, and it is the removal of this substance that gives great relief to the patient.

"In case nausea or vomiting occurs after the completion of gastric lavage, the latter should invariably be repeated. This, however, is usually not necessary, and it is rarely necessary to repeat it more than two or three times.

"The patient is permitted to take absolutely nothing by mouth, not even water, but he may rinse his mouth with cold water, being careful not to swallow any of it.

"The nutrition of the patient is supplied by employing a definite

form of rectal feeding. Much depends upon the fact that this is carried out exactly according to the following directions:

"One ounce of any of the pre-digested liquid foods in the market is dissolved in three ounces of warm normal salt solution and then is injected into the rectum in the following manner:

"A soft rubber catheter, not to exceed in size a No. 10 English or No. 25 French gauge, is thoroughly lubricated, a small funnel or a good-sized syringe is inserted in the open end of this catheter. In case a syringe is used the plunger is not employed. The catheter is then introduced into the rectum a distance not to exceed three inches and the liquid food is poured into the funnel or glass syringe and is permitted to enter the rectum by gravitation. It is important that the catheter be not introduced more than three inches; it is also important that no other food be substituted for the one mentioned.

"I have seen irritation resulting many times from the use of eggs, peptonized milk, mixtures of soup or gruel and a number of other forms of food in cases in which the irritation would subside at once when the above plan was vigorously followed.

"This food is given every three or four hours. If the patient suffers any pain, twenty drops of deodorized tincture of opium is added to each feeding. This is repeated until the pain has permanently subsided. It may be reduced to ten drops or increased to thirty drops as indicated in the individual case.

"At the same time the head of the bed is elevated from twelve to twenty-four inches, in accordance with the severity of the case, in order to have the advantage of gravity toward the pelvis in the peritoneal cavity, making use of the important principle introduced by Fowler.

"After the temperature and pulse are approximately normal and the abdominal muscles have become relaxed, the patient may be given small sips of hot water by mouth and later on cold water. It is well not to begin this for a day or two after the beginning of this treatment.

"In case of thirst, eight ounces of warm normal salt solution may be given by rectum in the same manner as the rectal feeding every half-hour until the thirst has subsided.

"During all of this time it is important that the abdomen be not manipulated violently. It is an easy matter during the physician's examination to distribute infection by violent diagnostic manipulation.

"After the acute symptoms have all subsided for two or three days, small quantities of commercial beef-tea may be given by mouth, then broth, and then the patient may be permitted to chew steak to get the juice but not the pulp, and then a general liquid diet may be given.

"It is well during the starvation period to permit the patient to chew gum in order to increase the flow of saliva, and thus prevent any infection of the parotid glands.

"If this form of treatment is carried out accurately in this limited class of cases, there can be no doubt but that the mortality will be enormously decreased."

During the inter-appendicial period the stimulating compress should be worn, as its use favors permanent resolution and prevents recur-

rence. Tonic hydrotherapy is indicated after the acute attack and during convalescence, whether the case has been operated upon or not. Of these measures, the electric light bath, followed by the horizontal rain bath, jet and fan douches, are the best.

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